CITY OF OREM
CITY COUNCIL MEETING
56 North State Street, Orem, Utah
March 8, 2016

This meeting may be held electronically to allow a Councilmember to participate.

3:00 P.M. WORK SESSION – PUBLIC SAFETY TRAINING ROOM

1. **BUDGET DISCUSSION/PREVIEW – Revenue and Compensation (45 min)**
   Presenters: Richard Manning
2. **DISCUSSION – PROTIP Update (75 min)**
   Presenters: Lori Labrum, Kevin Farley, and Greg Graham with AECOM; Janelle Robertson with UTA
3. **DISCUSSION – City Council Outreach (15 min)**
   Presenters: Steven Downs

5:00 P.M. STUDY SESSION – PUBLIC SAFETY TRAINING ROOM

PREVIEW UPCOMING AGENDA ITEMS

4. **Staff will present to the City Council a preview of upcoming agenda items.**

AGENDA REVIEW

5. **The City Council will review the items on the agenda.**

CITY COUNCIL - NEW BUSINESS

6. **This is an opportunity for members of the City Council to raise issues of information or concern.**

6:00 P.M. REGULAR SESSION - COUNCIL CHAMBERS

CALL TO ORDER
INVOCATION/INSPIRATIONAL THOUGHT: By Invitation
PLEDGE OF ALLEGIANCE: By Invitation

THE PUBLIC IS INVITED TO PARTICIPATE IN ALL CITY COUNCIL MEETINGS.
If you need a special accommodation to participate in the City Council Meetings and Study Sessions, please call the City Recorder's Office at least 3 working days prior to the meeting.
(Voice 229-7074)

This agenda is also available on the City's Internet webpage at orem.org

APPROVAL OF MINUTES

7. MINUTES of City Council Retreat – February 5-6, 2016
8. MINUTES of City Council Meeting – February 9, 2016
9. MINUTES of City Council Meeting – February 23, 2016

MAYOR'S REPORT/ITEMS REFERRED BY COUNCIL

10. UPCOMING EVENTS
11. APPOINTMENTS TO BOARDS AND COMMISSIONS
Beautification Advisory Commission.....1 vacancy
Library Advisory Commission .....1 vacancy

CITY MANAGER'S APPOINTMENTS

12. APPOINTMENTS TO BOARDS AND COMMISSIONS

PERSONAL APPEARANCES – 15 MINUTES

13. Time has been set aside for the public to express their ideas, concerns, and comments on items not on the Agenda. Those wishing to speak should have signed in before the beginning of the meeting. (Please limit your comments to 3 minutes or less.)

CONSENT ITEMS

14. MOTION – Reschedule the March 22, 2016 City Council Meeting to March 29, 2016

SCHEDULED ITEMS

6:10 P.M. PUBLIC HEARING – Rezone PD-22 and R8 to HS zone – 1045 North 1200 West

15. ORDINANCE – Amending the General Plan by changing the land use designation on approximately 0.47 acres from Low Density Residential (LDR) to Regional Commercial (RC) and amending Section 22-5-3(A) and the zoning map of the City of Orem by rezoning approximately 1.83 acres of property located at 1045 North 1200 West from the PD-22 and R8 zones to the Highway Services (HS) zone

PRESENTER: Jason Bench

REQUEST: The applicant requests the City amend the General Plan by changing the land use designation on approximately 0.47 acres from Low Density Residential (LDR) to Regional Commercial (RC) and amend Section 22-5-3(A) and the zoning map of the City of Orem by zoning approximately 1.83 acres of property located at 1045 North 1200 West from the PD-22 and R8 zones to the HS zone.

POTENTIALLY AFFECTED AREA: Timpview Neighborhood

BACKGROUND: The applicant proposes to construct a new office building with 21,500 square feet on property at 1045 North 1200 West. The property on which the development is proposed consists of two separate parcels. The first parcel is located on 1200 West directly north of BJ's Plumbing at 1045 North and is currently zoned PD-22 (Northgate). The second parcel is located directly north of and adjacent to the first parcel. The second parcel is currently zoned R8 and has access from a residential cul-de-sac (1160 West).

There are a number of elements related to the current zoning that the applicant would like to change in order to develop the property as desired. The first issue concerns parking. The PD-22 zone requires five stalls per thousand square feet which is a higher standard than the City's other commercial zones which typically require four stalls per thousand square feet. The lower parking standard of the HS zone (which would require 22 fewer stalls for a building of this size) would enable the applicant to add an additional 5,000 square feet of space in a basement level which it would otherwise be unable to do.

Rezoning the property to HS would also grant the applicant greater flexibility with regard to architectural style and exterior finish materials. The PD-22 zone requires buildings to comply with a Tuscan architectural style and exterior finish materials. The HS zone would simply require that the building be finished with brick, fluted block, colored textured block, glass, synthetic stucco and/or wood.

The applicant also desires to rezone the second parcel from R8 to HS so that it can be used as parking area for the office building. The grade of this second parcel will be lowered substantially so that its use as parking would have a reduced impact on the adjoining residential lots. The access to this lot from the cul-de-sac will be eliminated and it is anticipated that the area of the access will be conveyed to the adjoining residential lots.

The applicant's proposed development will require considerable grading on the property due to the existing slope. Formal approval of the grading plan will be required prior to site plan approval.

A neighborhood meeting regarding the proposed rezone was held on December 10, 2015, at the City Center with three people in attendance. At the meeting the proposed site plan was shown and the need for the residential lot for parking was discussed. The two neighbors adjacent to the residential parcel were concerned with the existing access from the cul-de-sac that they use to access their backyards and whether the project would be accessed from the cul-de-sac. They were informed that the project will not be accessible from the cul-de-sac and the stem of the flag lot will be deeded to the adjacent property owners to maintain their backyard access.

No issues from residents were expressed during the Planning Commission public hearing on February 17, 2016.

The traffic study for the project showed that rezoning the residential property to a commercial use would allow for a larger building and the increase in trip generation would be minimal (an extra 44 trips a day).

RECOMMENDATION: The Planning Commission recommends the City Council amend the General Plan by changing the Land Use designation on approximately 0.47 acres from Low Density Residential (LDR) to Regional Commercial (RC) and amend Section 22-5-3(A) and the zoning map of the City of Orem by zoning approximately 1.83 acres of property located at 1045 North 1200 West from the PD-22 and R8 zones to the HS zone. City staff supports the Planning Commission recommendation.

6:30 P.M. PUBLIC HEARING – 2nd Quarter Budget Amendments

16. ORDINANCE – Amending the Current Fiscal Year 2015-2016 Budget

PRESENTER: Richard Manning

POTENTIALLY AFFECTED AREA: Citywide

BACKGROUND: The Fiscal Year 2015-2016 City of Orem budget has many adjustments that occur throughout the fiscal year. These adjustments include grants received from Federal, State, and other governmental or private entities/organizations; receipt of rental fees for use of the City's athletic fields; additional funds received for the adult flag football program due to increased participation; the debt disbursement related to the sale of a piece of property in the Northgate SID that occurred in the prior fiscal year; increasing revenue and available capital project funds due to the previously approved increase to the City's storm sewer fee; and various other smaller technical corrections or minor budget adjustments that need to be made.

RECOMMENDATION: The City Manager recommends the City Council hold a public hearing to discuss amending the current Fiscal Year 2015-2016 Budget and, by ordinance, amend Fiscal Year 2015-2016 Budget.

17. RESOLUTION – Adopt the 2016 Sewer Master Plan and accept the Sewer User Rate Study

PRESENTER: Chris Tschirki and Neal Winterton

RECOMMENDATION: The Public Works Director recommends that the Orem City Council, by resolution, adopt the 2016 Sewer Master Plan prepared by Bowen Collins & Associates, Inc. (BCA) and accept the Sewer User Rate Study prepared by Lewis Young Robertson & Burningham, Inc (LYRB).

POTENTIALLY AFFECTED AREA: Citywide

BACKGROUND: The Orem Water Reclamation Facility (OWRF) was constructed in 1958. Major upgrades were completed in 1984, 1994, and 2012. The OWRF treats an average of 8 million gallons of sanitary sewer per day. The OWRF includes 160 pumps, high-tech controls and instruments, blowers, digesters, clarifiers, back-up generators, and a recently added ultra-violet disinfection system. Following a very strict and specific permit issued by the State of Utah Division of Water Quality (DWQ), which is regulated by the USEPA Region 8, the OWRF discharges treated water to Powell Slough. The collection

system consists of over 287 miles of pipe, 6,000 manholes, 6 lift stations, 6 miles of pressurized force main.

In February 2014, the City hired BCA to perform a Sewer Master Plan. The request for engineering services was organized into 12 tasks. Some of the highlights include: develop a hydraulic model, identify existing and future needs, develop a Capital Facilities Plan, recommend a solution to the struvite problem at the OWRF, evaluate maintenance and manpower, and develop sewer rates to support the operations and capital needs of the sewer utility. Together with City staff, the Public Works Advisory Commission, the general public, and the City Council, BCA has created a sewer master plan for consideration.

Recommended improvements identified by BCA include improvements to both the OWRF and the collection system totaling $48 million (present value). Some projects are identified by specific address and others, in future years, are yet to be determined and will be constructed as the need is identified with a full condition assessment. The City sewer maintenance efforts include CCTV and inspection - about 20,000' per month. More than half of the City's sewer collection system consists of concrete pipe that is susceptible to hydrogen sulfide gas. Lining concrete pipe prior to losing its integrity or completely failing is a measure similar to overlaying a road versus total reconstruction. The rehabilitation extends the life of the pipeline, is about 30-40% of the cost and, in the case of sewer, prevents a potentially disastrous event.

LYRB was subcontracted by BCA to review the existing sewer rates and provide a recommended rate schedule based on changes in forecasted expenses and capital improvements and on a pay-as-you-go basis. The primary objectives of the rate analysis were to ensure sufficient revenues to cover all operation and maintenance expenses while maintaining bond covenants, ensuring the appropriate debt service coverage ratio, and providing sufficient revenue to fund the proposed projects identified in the master plan.

A review of projected revenues under the existing rate structure relative to proposed expenses illustrated that the City would not have sufficient revenues to fund the needed capital improvements without a rate increase. The results of this master plan were the basis for a rate study that was used to establish supporting sewer rates for the City. Originally, a 5-year rate increase was proposed by City staff in conjunction with BCA and LYRB. After receiving public feedback and upon the recommendation of the City Council, a pay-as-you-go funding plan over 5-, 7-, and 10-year periods, and a bonding plan, were developed.

In January 2016, the City Council adopted a plan to change the billing procedure for the sewer base rate for multi-unit residential accounts and non-residential accounts with a water meter larger than 3/4 inch. Due to the change, in the first year of all plans a rate increase was not deemed necessary.

The rate scenarios shown below are structured to produce a 2026 final base rate of $16.03 and a final volume rate of $3.66/1,000 gallons. Scenarios 2 and 3 fund a reduced CIP in order to allow for a more moderate annual increase in the rates. Scenarios 2 and 3 result in an overall revenue reduction of $2,527,838 and $5,885,836, respectively, over the same 10-year period. The result is a delay in completion of capital facility projects and an on-going liability for increased sewer line maintenance and potential failures. Scenario 4

includes some bonding and allows for projects to be completed within the 5-year CIP plan but keep rates to more moderate increases.

Scenario 1: 5-Year					
Year	Base Rate	Production Rate	Monthly Increase per SFH	Cumulative Monthly Increase	Total CIP
2016	$9.32	$1.42	$0.00	$0.00	$1,000,000
2017	$9.32	$1.42	$0.00	$0.00	$2,339,818
2018	$9.32	$2.13	$5.68	$5.68	$3,808,706
2019	$10.72	$2.45	$3.96	$9.64	$4,748,215
2020	$12.11	$2.77	$3.95	$13.59	$5,574,372
2021	$13.44	$3.07	$3.73	$17.32	$6,435,555
2022	$14.11	$3.22	$1.87	$19.19	$6,656,442
2023	$14.67	$3.35	$1.60	$20.79	$6,884,902
2024	$15.11	$3.45	$1.24	$22.03	$7,121,196
2025	$15.56	$3.55	$1.25	$23.28	$7,365,592
2026	$16.03	$3.66	$1.35	$24.63	$7,589,560
Effect on CIP	$0				

Scenario 3: 10-Year					
Year	Base Rate	Production Rate	Monthly Increase per SFH	Cumulative Monthly Increase	Total CIP
2016	$9.32	$1.42	$0.00	$0.00	$1,000,000
2017	$9.32	$1.42	$0.00	$0.00	$2,339,818
2018	$9.32	$1.85	$3.44	$3.44	$3,082,893
2019	$10.44	$2.07	$2.88	$6.32	$3,870,292
2020	$11.69	$2.32	$3.25	$9.57	$4,653,328
2021	$12.86	$2.55	$3.01	$12.58	$5,231,885
2022	$13.89	$2.75	$2.63	$15.21	$5,757,901
2023	$14.72	$2.97	$2.59	$17.80	$6,271,586
2024	$15.31	$3.21	$2.51	$20.31	$6,702,834
2025	$15.72	$3.47	$2.49	$22.80	$7,139,571
2026	$16.03	$3.66	$1.83	$24.63	$7,586,560
Effect on CIP	$5,885,836				

Scenario 2: 7-Year					
Year	Base Rate	Production Rate	Monthly Increase per SFH	Cumulative Monthly Increase	Total CIP
2016	$9.32	$1.42	$0.00	$0.00	$1,000,000
2017	$9.32	$1.42	$0.00	$0.00	$2,339,818
2018	$9.32	$1.85	$3.44	$3.44	$3,282,893
2019	$10.72	$2.18	$4.04	$7.48	$4,170,292
2020	$12.33	$2.53	$4.41	$11.89	$5,053,328
2021	$13.56	$2.78	$3.23	$15.12	$5,831,885
2022	$14.37	$3.00	$2.57	$17.69	$6,357,901
2023	$14.94	$3.24	$2.49	$20.18	$6,884,902
2024	$15.39	$3.40	$1.73	$21.91	$7,121,196
2025	$15.77	$3.57	$1.74	$23.65	$7,365,592
2026	$16.03	$3.66	$0.98	$24.63	$7,586,560
Effect on CIP	$2,527,838				

Scenario 4: Bonding					
Year	Base Rate	Production Rate	Monthly Increase per SFH	Cumulative Monthly Increase	Total CIP
2016	$9.32	$1.42	$0.00	$0.00	$1,000,000
2017	$9.32	$1.42	$0.00	$0.00	$2,339,818
2018	$9.32	$1.85	$3.44	$3.44	$7,243,498
2019	$10.25	$2.07	$2.69	$6.13	$3,503,661
2020	$11.28	$2.32	$3.03	$9.16	$4,250,862
2021	$12.41	$2.55	$2.97	$12.13	$11,756,043
2022	$13.40	$2.75	$2.59	$14.72	$4,774,233
2023	$14.34	$2.97	$2.70	$17.42	$5,304,597
2024	$15.06	$3.21	$2.64	$20.06	$5,756,898
2025	$15.59	$3.47	$2.61	$22.67	$6,213,169
2026	$16.03	$3.66	$1.96	$24.63	$6,681,504
Effect on CIP	$0				

COMMUNICATION ITEMS

18. There are no Communication Items.

CITY MANAGER INFORMATION ITEMS

19. This is an opportunity for the City Manager to provide information to the City Council. These items are for information and do not require action by the City Council.

ADJOURNMENT

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OREM CITY COUNCIL RETREAT
The Homestead
700 North Homestead Drive
Midway, Utah 84049
February 5, 2016

2:00 P.M. RETREAT

CONDUCTING	Mayor Richard F. Brunst
ELECTED OFFICIALS	Councilmembers Debby Lauret, Sam Lentz, Tom Macdonald, Mark Seastrand, David Spencer, and Brent Sumner
APPOINTED STAFF	Jamie Davidson, City Manager; Brenn Bybee, Assistant City Manager; Richard Manning, Administrative Services Director; and Chris Tschirki, Public Works Director

Mayor Brunst welcomed all in attendance. He reviewed the agenda for the retreat, and turned the time to Mr. Davidson and Mr. Bybee for discussion.

Mr. Davidson and Mr. Bybee led a discussion with the Mayor and City Council about the accomplishments of the past year. The discussion focused on the goals set by the Council at the retreat held in 2015. Those goals were:

- Harmony
- UTOPIA
- Communications
- Utility Master Planning
- Employee Development
- City Facilities
- Economic Development
- Financial Sustainability

Mr. Davidson asked the Council to assess the progress made for each goal. The general consensus was that progress had been made in each area, and there were goals that still needed improvement. UTOPIA was identified as the area that needed the most improvement from the list.

Mr. Tschirki led a discussion about the utility rates and master plans. He shared a quote from Tai Riser, Public Works Advisory Commission Chairman, which said, *"The Public Works Advisory Commission supports a pay-as-you-go funding model whenever possible. Bonding should only be considered to pay for large projects that are urgent and need a large sum of money up front, such as water tanks, water reuse, meter replacements, wells, or other similar projects."* Mr. Tschirki shared a slide presentation which included graphical representation of total monthly bills for the water, sewer, and storm water utilities. He reviewed with the Council the proposed 5-, 7-, and 10-year rate increase options. He shared some projections for cost per year if bonding

was used to fund the projects. He went through the timeline for the adoption of the utility master plans and emphasized that a preferred rate plan would need to be adopted as well.

Mr. Tschirki reviewed the pros and cons of using either a pay-as-you-go funding option or a bond funding option:

- Pay-as-you-go: Pros and Cons
  - Pros
    - Pay no interest
    - Accumulate no debt
  - Cons
    - Must save over extended period for large, urgent projects
    - Accomplish less immediately
    - Current users pay
    - Future users enjoy the benefit without paying
- Bonding: Pros and Cons
  - Pros
    - Accomplish more immediately
    - Spread cost over time
    - All users pay
    - Large, urgent projects can be accomplished now
  - Cons
    - Pay more in interest
    - Extended period pay-off
    - Extended debt

The Council had a brief discussion about the proposed 5-, 7-, and 10-year plans for utility rate increase options, and the different advantages to pay-as-you-go versus bonding.

***The Council took a break at 4:50 p.m.*

***The meeting resumed at 5:00 p.m.*

Mayor Brunst invited Mr. Manning to present information about the FY 2016-2017 Budget – Revenues and Priorities.

Mr. Manning shared a presentation on information about the City's General Fund revenues. One slide showed a property tax comparison with other cities of similar size to Orem. Mr. Manning said $1,000 in 1978 had the same buying power as $3,635 today. He said if property tax had kept pace with inflation the City would have $22 million per year, which was a little more than the cost of police and fire. The City received $119 for every $100,000 of business valuation and $65 for every $100,000 of residential. He said the rule of thumb was to cover the cost of police and fire with property tax due to the stability of property tax as a revenue stream. If property tax had increased at ½ the rate of inflation, then add in the fees the City collected for police and fire type services, ambulance, Lindon and Vineyard fire, police reports, etc., then the cost of police and fire would be covered. The rate for a typical $250,000 home would have increased from $163 to $297.

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Mr. Manning said the State was projecting a 5.392 percent increase in sales tax in FY '17. The City typically would lag the State's projected growth. Presently, the City was on a trend to reach $19.5 to $19.6 million in FY '16. The Utah and national economies were projected to continue with slow growth; 2.0-2.5 percent range for the nation. Utah County led the nation in job growth last year at 6.7 percent with an unemployment rate change of 0.7 percent. Wages increased in the County by 1.9 percent. He said a simple way to project sales tax growth was to add the percentage drop in unemployment to the wage growth sums to 2.6 percent. Add this to our projected sales tax receipts in FY '16 and the City should expect to receive $20 million to $20.1 million in FY '17.

Mr. Manning reviewed information about franchise tax amounts and sources. He said Franchise Tax consisted of a 6 percent tax on electricity, natural gas, water, sewer, and a 3.5 percent tax on telephone and cable. This tax was subject to the rise and fall of the economy as well as extremes in weather.

There was discussion about the fluctuation in revenues from various city services, including ambulance and 911 services, cemetery lot sales and burial fees, and utility fees. Mr. Manning said there would be continuing conversations about the General Fund and City revenue sources as they prepared to finalize the FY 2016-2017 Budget.

Mayor Brunst went over the agenda for the second day of the retreat. The Council then participated in social activities and adjourned for the evening at 9:30 p.m.

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OREM CITY COUNCIL RETREAT
The Homestead
700 North Homestead Drive
Midway, Utah 84049
February 6, 2016

8:00 A.M. RETREAT

CONDUCTING	Mayor Richard Brunst
ELECTED OFFICIALS	Councilmembers Debby Lauret, Sam Lentz, Tom Macdonald, Mark E. Seastrand, David Spencer, and Brent Sumner
APPOINTED STAFF	Jamie Davidson, City Manager; and Brenn Bybee, Assistant City Manager

Mayor Brunst welcomed everyone back and reviewed the day's schedule.

The Council discussed some Council concerns, specifically public noticing requirements and the Good Landlord program. There had been some concern about the radius used to send notice about public hearings. The City's policy on notice was updated in 2003 and expanded, beyond the State requirement of 300 feet of the site, to 500 feet. The information handed out showed the notice requirements of other Utah cities, which were either at 300 or 500 feet.

The Good Landlord program was a program Orem was considering to implement. It would be an incentive program aimed at addressing aspects of property management that might encourage the elimination of code violations and public nuisances while controlling and preventing illegal activity on rental properties that could affect the quality of life within Orem neighborhoods. Other cities had implemented the program, which created significant additional workload. If Orem were to implement the program, an additional staff member would be required to manage the workload. There would be a cost to be included in this program, and it seemed likely the costs would be shared between landlord and tenants.

Some other items of discussion were:

- Hold some Town Hall meetings or "Ask me any question" meetings with the public
- Set aside an hour in Work Sessions just for Committee reports and/or open discussions
- Create a "Wedge" Master Plan (for the area in between Geneva Road and I-15)
- Have some CARE funds go toward field maintenance for recreation
- Create a one-page Executive Summary of the accessory apartment rules for the Council
    - Come up with an education effort over the next 6 months that helps home-owners know how to come into compliance
    - Work with the Apartment Association

***The Council took a break at 10:00 a.m.*

***The meeting resumed at 10:10 p.m.*

Mayor Brunst and Mr. Davidson updated the Council about UTOPIA and UIA. Some ideas mentioned during the subsequent discussion were:

- Have an employee become an expert on how to get people signed up for UTOPIA
- Find out what it would cost to do micro-trenching throughout the City
- Look into the feasibility of "banning exclusive provider agreements" that do not allow UTOPIA to be offered in their development
- Use Utility Billing to notify people that they are eligible to sign up for UTOPIA
- Consider enterprise fund and associated utility fee for UTOPIA debt retirement
    - But keep in mind timing of Water/Sewer/Storm Drain utility fee increases
    - Perhaps could be done in association with Street Light fees going down

The Council then had a discussion about City facilities, focusing much of the conversation on the City Center building. The City Center building was in need of many upgrades. The Council discussed using the City Center node as a "kick-off" or starting point for the State Street Master Plan. They also discussed the City Center campus buildings, like the courthouse and recreation facilities. They wanted to make sure they were good stewards for City amenities.

***The Council took a lunch break at 12:00 p.m.*

***The meeting resumed at 12:45 p.m.*

Mr. Davidson led a discussion on the City Council's 2016-2017 goals/areas of focus. He asked the Council to identify specific areas of focus that would be their "Wildly Important Goals" or WIGs. Two WIGs the conversation focused on were a City Center Plan and UTOPIA. They felt those were important issues facing the City and planned to focus on these issues in the future.

Mayor Brunst thanked the Council members for their hard work and dedication in service to their community. He expressed appreciation for the efforts of city staff to make the retreat the successful event it had been.

The meeting adjourned at 2:00 p.m.

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CITY OF OREM
CITY COUNCIL MEETING
56 North State Street Orem, Utah
February 9, 2016

2:00 P.M. TOUR – WASTE MANAGEMENT AND NORTH POINTE SOLID WASTE SPECIAL SERVICE DISTRICT

TOUR – Waste Management and North Pointe Solid Waste Special Service District

Those from the City who attended the tour were: Mayor Richard F. Brunst, Councilmembers Debby Lauret, Sam Lentz, Mark Seastrand, David Spencer, and Brent Sumner; City staff members Jamie Davidson, Brenn Bybee, Steven Downs, Bill Bell, Karl Hirst, Scott Gurney, Gary Giles, Charlene Crozier, Richard Manning, and Jackie Lambert.

Waste Management (WM) staff Beth Holbrook, Brad Kloos, and Brian Eberhard conducted a tour of the Orem Waste Management facility. Waste Management staff provided information about compressed natural gas (CNG) pickup trucks, service routes in Orem and other cities WM serves.

Mr. Lentz asked Mr. Kloos what the WM drivers wished those on their routes knew to help improve the level of service to them. Mr. Kloos said generally they did not have many issues with their pickup routes. The most helpful thing would be for residents to remember to place cans three feet apart from each other, and to remember not to place cans near parked cars or other obstructing objects.

Those from the City who attended the tour were: Mayor Richard F. Brunst, Councilmembers Debby Lauret, Sam Lentz, Mark Seastrand, David Spencer, and Brent Sumner; City staff members Jamie Davidson, Brenn Bybee, Steven Downs, Bill Bell, Karl Hirst, Scott Gurney, Gary Giles, Charlene Crozier, Richard Manning, and Jackie Lambert.

District Manager Roger Harper conducted a tour of the North Pointe Special Service District Transfer Station. Mr. Harper gave a presentation on the history of North Pointe and other statistical information about the special service district and the transition to being a solid waste transfer station. The tour included the main A and B buildings for mixed residential waste, the construction and demolition waste area, the green waste area, and the cardboard and concrete recycling areas.

4:00 P.M. WORK SESSION – PUBLIC SAFETY TRAINING ROOM

CONDUCTING	Mayor Richard F. Brunst
ELECTED OFFICIALS	Councilmembers Debby Lauret, Sam Lentz, Mark Seastrand, David Spencer, and Brent Sumner
APPOINTED STAFF	Jamie Davidson, City Manager; Brenn Bybee, Assistant City Manager; Greg Stephens, City Attorney; Richard Manning, Administrative Services Director; Bill Bell,

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Development Services Director; Karl Hirst, Recreation Director; Chris Tschirki, Public Works Director; Scott Gurney, Fire Department Director; Gary Giles, Police Department Director; Charlene Crozier, Library Director; Jason Bench, Planning Division Manager; Neal Winterton, Water Division Manager; Reed Price, Maintenance Division Manager; Steven Downs, Assistant to the City Manager; and Jackie Lambert, Deputy City Recorder

EXCUSED Tom Macdonald

FOLLOW-UP – Waste Management Tour

Beth Holbrook, Waste Management Public Sector Solutions Manager, thanked the City for the opportunity to host the tour and provide more information about Waste Management operations. They were happy to be the service providers for Orem. She said they were hoping to educate residents on recycling to have a more productive and streamlined recycling program. They did a lot of community events, including e-waste recycling activities that were coordinated through LG. She said the most recent e-waste recycling activity was a great success, and she looked forward to more activities like that in the future. Ms. Holbrook said an issue that sometimes came up was fire within the garbage trucks, or at North Pointe. She said there were times when residents did not know how to properly dispose of flammable waste, and sometimes that combustible waste started fires in the garbage trucks. That would be a problem in a regular garbage truck, but was particularly dangerous for the compressed natural gas (CNG) trucks. She encouraged residents not to simply throw flammable waste into the garbage cans but to take the time to learn how to properly dispose of it.

Mayor Brunst thanked Ms. Holbrook and Mr. Bybee for coordinating the tour. He said Orem was lucky to work with Waste Management and the North Pointe Special Service District.

DISCUSSION – Automated Metering Infrastructure

Mr. Tschirki presented information about Automated Metering Infrastructure (AMI). He said they had installed AMI readers at approximately nineteen residences, including the homes of the Mayor, the previous City Council, and some City staff. He said the meters allowed consumers to review the data about their own personal water consumption. He showed some graphs with actual data from his own home for water consumption over the last twelve months. In reviewing that data, he said he had determined there was a leak in a basement bathroom. The toilet was the problem. Without the AMI reader he likely would not have found the leak for some time. The toilet was running, but very quietly and the leak was almost imperceptible. He saw that over the course of one month that leak caused a water loss of approximately 5,808 gallons of water. He saw that the leak had gotten worse over time, and was able to see that through the data collected by AMI. He said the calculation of water usage was much higher than actual gallons used because of the leak and he would have to pay for that amount. AMI was a helpful tool for the consumer to monitor water usage and catch leaks before they became significant. This would also help the City because less water would be lost to leakage.

Mr. Tschirki said of the nineteen AMI readers installed, four of them had shown leaks which was a high percentage in such a small group. Because of inaccurate meter reading, some residents

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were paying approximately 30 percent of what they should be paying for water while others were paying 120 percent. The AMI system would help address fairness and conservation issues. He said the readers would provide leak detection, backflow detection, liability reduction, and would improve customer service and water conservation.

Mr. Winterton said some consumers were alerted to leaks and chose to do nothing about them because paying the extra for their water bill was cheaper than fixing the problem. That was an issue they hoped to address.

Mr. Tschirki said AMI would make for better circumstances for meter readers, who often ran into animals and other pests, as well as irate customers. He said Senate Bill 28 was currently being discussed in the Utah State Legislature. The bill required retail water providers to establish an increasing rate structure for culinary water and provide certain information to customers such as block unit rates, billing cycles, and individual customer water usage. He said it would likely include a tiered rate structure not unlike that used by Rocky Mountain Power. This was a statewide issue, not just an Orem one.

Mr. Lentz asked if the AMI would allow for an alert set at a certain gallon amount. Mr. Tschirki said depending on the manufacturer that was a possibility. Some AMI systems allowed for leak alerts to be edited by the customer and they could access and export the data for their own tracking if they wished. That put the power into their hands in analyzing their own water consumption.

Mr. Winterton said the dashboard and specific interface that customers would use was dependent on the service provider. He said he believed most providers had an alert setting the customers could control.

Mayor Brunst asked if the new Council members could have the AMI readers installed at their homes. Mr. Tschirki said he could do that.

DISCUSSION – CARE Five-Year Plan

Mr. Hirst said there were three projects they were currently addressing: the splash pad, the dog park, and the All-Together Playground. He said the Recreation Advisory Commission (RAC) had suggested potentially tabling the dog park funding to reallocate funding toward the splash pad at this time. He reiterated that the RAC's suggestion was just that—a suggestion, and the ultimate decision would be up to the City Council. Another item the RAC had discussed was a refurbishment of the Orem Fitness Center (OFC). During the OFC's annual fall maintenance shutdown they hoped to install a Myrtha liner in the competitive pool, retile the hot tub and steam room, add some ADA lifts, and reline the sewer laterals from the showers and toilets. The RAC had considered adding some funding to those proposed projects, as well as potentially giving to cosponsored sports' operating and management funds. Mr. Hirst said the hope was to get Council direction and feedback, and bring a recommendation for CARE recreation allocations through the next five years.

Mayor Brunst said it would not be his preference to table the dog park, as he regularly received feedback from residents who wanted a dog park sooner rather than later. He said it would be good to focus on the three projects of the splash pad, the dog park, and the all-abilities

playground until the funding was there before bringing in other projects like the OFC refurbishment for consideration. He thought if the City was going to build a splash pad, they should do it well. He said he liked the idea of the cosponsored sports support, and he wanted to make improvements at the OFC in the future.

Mr. Davidson said the goal of the five-year plan was to determine a project's funding allocation and prioritization, and look at the best options for each project. He said with a plan in place they could more easily decide how to fund certain projects, and if opportunity costs should be considered. They had funding options to consider as well.

Mayor Brunst asked if a dog park could be financed and built this year. Mr. Hirst said it could, and the plan he was working on included the dog park and the splash pad for this year. He said he had some funds available that were savings from the new OFC indoor pool a few years ago that could be used to have design plans drawn up. He was not able to give more specific data at this point because he needed some direction from the Council first.

Mr. Davidson said the money was available for the projects across the five years, but the question was how to make it work from a cash flow perspective. They needed to determine what would make the most sense in terms of where and how the funding would flow.

Mr. Sumner said he would like to hear the full recommendation of the RAC. He asked Mr. Hirst if the dog park issue was being pushed unnecessarily, and the RAC's recommendation made more sense at this time. Mr. Hirst said he still regularly heard from dog owners that wanted a dog park. The tentative location by the Skate Park had seen less resistance than other proposed locations, though he had received emails about concerns for traffic and the proximity to the fire station.

Mr. Spencer said the RAC had looked at the current allocation amounts and thought the splash pad would make more sense to fully fund at this point.

Mr. Seastrand wondered what the big picture plan was for the OFC. He said revenue was lower there than it had been in many years, despite the new pool and other refurbishments made. He asked what the strategy was to raise the revenues, and if it made sense to spend approximately $3 million to fix it up. He personally was struggling to see the end game.

Mr. Davidson said he understood Mr. Seastrand's concerns. Mr. Davidson said the approximately $3 million dollars at the OFC would not be for new amenities only but would include ongoing maintenance issues that needed to be addressed. Many had been delayed time and time again, and could no longer be ignored. He said the idea of "breaking even" with the OFC did not make sense, as the OFC had never been breakeven. There were capital costs in additional to staff and ongoing maintenance costs. Services like police, fire, parks, and most recreation centers did not break even. He said a better business plan could be developed for the OFC, but it was something of a specialty facility in the face of the gyms and CrossFit centers popping up on every corner. It was a facility for the whole family.

Mrs. Lauret suggested that the City reach out to the County regarding the All-Together Playground. She asked if it was Mr. Hirst's suggestion to table the splash pad to accommodate

the "face lift" for the OFC. Mr. Hirst said it was his suggestion not to table the splash pad, and that the OFC upgrades could be done next year.

Mr. Lentz asked if a revenue bond was being considered against CARE funds. Mr. Davidson said it was not, but the idea was to borrow from City funds and charge an interest rate so that the following year the CARE allocation would reimburse the other fund. He said it was an opportunity to leverage the finance through Orem.

Mr. Seastrand restated his concern that CARE tax monies were being used to cover certain costs because the revenue was not being generated. He did not want facilities like the OFC to be so heavily CARE tax dependent that they could not feasibly be maintained without it.

Mr. Davidson said he understood Mr. Seastrand's concern, and said they tried to be sensitive to that issue. The CARE tax 50/50 split between recreation and cultural arts was also something they needed to balance.

DISCUSSION – Siemens Energy Update

Mr. Bell said he hoped to answer questions the Council may have about the proposed Siemens item on the evening agenda. He said the upgrades from this agreement would save close to $50,000 a month in energy savings for the City. They wanted to be good stewards and protect the amenities of the City in such a way that would not require new money. He introduced Mark Cram, Kevin Brown, and Trevor Mays with Siemens who were available to answer questions.

Mr. Seastrand asked if the agreement would have the City coming out ahead in terms of finance. Mr. Bell said the guarantee from Siemens was that if the savings were not met or fell short, then Siemens would pay to make up the difference.

Mr. Davidson said in order to save money some money would have to be spent. The agreement with Siemens provided the financial mechanics to allow the City to make necessary changes and upgrades and repay the money over time based on savings generated.

Mr. Bell shared an example of the Senior Center boiler. He said it was scheduled to be replaced under the Siemens agreement, and earlier that week Orem staff Charlie Powell was performing a routine check of the boiler and found a hole. Mr. Bell said that boiler would cost $90,000.

Mr. Sumner asked what Orem's responsibility would be if the lights were replaced by Siemens and then a better product came about some three or four years later.

Mr. Bell said it was possible newer/better products would come about in the future, but replacing the lights now would see the savings now. As items rotated through the system, they were warrantied for twelve years with this project. If a light malfunctioned or went out, Siemens would send a contractor to fix it.

Mr. Cram said the cost of sending a contractor was part of the contract so the City would not be billed for that. Some costs were built into the cash flow model. He said the materials themselves were under warranty. They had taken the manufacturer's calculations on failure rates and they

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did so conservatively, but there would be a cost for replacing. Orem staff could continue to do the replacing, or work with Siemen's contractor Taylor Electric, Inc.

Mr. Sumner said he was concerned about the complaints in the past about the dimness or brightness of street lights. He worried about replacing all the City's street lights without first testing the lights in a smaller area.

Mr. Brown said they were working with the same manufacturer the City already worked through, so they would be the same lights. He said they had done the streetlight replacements in six other Utah cities. The LED lights were a better quality light as well as more energy efficient. They would be installed according to City specifications. He said there would likely still be occasional complaints, but they had done everything they could to keep light from being cast into homes. Comments about the street lights were more often positive than negative.

Mr. Cram said LED street lighting was now acceptable to Rocky Mountain Power, and he believed many other cities would be making the change to LED street lighting in the near future. Mr. Davidson agreed, and added that there may be a time soon when LED street lighting was the only option.

Mr. Lentz said he had LED lighting on his street and he loved it. He asked if during the course of the upgrades an identified project could become irrelevant and what happened to the funds budgeted for that project? Mr. Bell said most likely that funding would go into a contingency account.

Mayor Brunst asked about the time period for the upgrades. Mr. Cram said it would be an eighteen-month period. He said most of the measures would take twelve months or less, but they wanted to have a cushion if needed for large projects like street lights. He said once the agreement was in place, they could begin work on the project within sixty days of the agreement's execution.

Mayor Brunst asked for references from other cities that had worked with Siemens. Mr. Bell said City engineer Taggart Bowen had spoken with every reference Siemens had provided in Utah, and they had only good things to say.

5:00 P.M. STUDY SESSION – PUBLIC SAFETY TRAINING ROOM

CONDUCTING	Mayor Richard F. Brunst
ELECTED OFFICIALS	Councilmembers Debby Lauret, Sam Lentz, Tom Macdonald, Mark Seastrand, David Spencer, and Brent Sumner
APPOINTED STAFF	Jamie Davidson, City Manager; Brenn Bybee, Assistant City Manager; Greg Stephens, City Attorney; Richard Manning, Administrative Services Director; Bill Bell, Development Services Director; Karl Hirst, Recreation Director; Chris Tschirki, Public Works Director; Scott

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Gurney, Fire Department Director; Gary Giles, Police Department Director; Charlene Crozier, Library Director; Jason Bench, Planning Division Manager; Paul Goodrich, Transportation Engineer; Keith Larsen, Traffic Operations Engineer; Sam Kelly, Engineer; Neal Winterton, Water Division Manager; Reed Price, Maintenance Division Manager; Steven Downs, Assistant to the City Manager; and Jackie Lambert, Deputy City Recorder

Preview Upcoming Agenda Items

Staff presented a preview of upcoming agenda items.

Agenda Review

The City Council and staff reviewed the items on the agenda.

City Council New Business

There was no City Council new business.

The Council adjourned 5:48 p.m. to the City Council Chambers for the regular meeting.

6:00 P.M. REGULAR SESSION – COUNCIL CHAMBERS

CONDUCTING	Mayor Richard F. Brunst
ELECTED OFFICIALS	Councilmembers Debby Lauret, Sam Lentz, Mark Seastrand, David Spencer, and Brent Sumner
APPOINTED STAFF	Jamie Davidson, City Manager; Brenn Bybee, Assistant City Manager; Greg Stephens, City Attorney; Richard Manning, Administrative Services Director; Bill Bell, Development Services Director; Karl Hirst, Recreation Director; Chris Tschirki, Public Works Director; Scott Gurney, Fire Department Director; Gary Giles, Police Department Director; Charlene Crozier, Library Director; Jason Bench, Planning Division Manager; Steven Downs, Assistant to the City Manager; and Jackie Lambert, Deputy City Recorder
EXCUSED	Tom Macdonald
INVOCATION / INSPIRATIONAL THOUGHT	Drew Burton
PLEDGE OF ALLEGIANCE	Sam Bunker

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APPROVAL OF MINUTES

Mr. Sumner **moved** to approve the December 8, 2015, City Council meeting minutes. Mr. Lentz **seconded** the motion. Those voting aye: Richard F. Brunst, Debby Lauret, Sam Lentz, Mark Seastrand, David Spencer, Brent Sumner. The motion **passed unanimously**.

Mr. Sumner **moved** to approve the January 12, 2016, City Council meeting minutes. Mr. Lentz **seconded** the motion. Those voting aye: Richard F. Brunst, Debby Lauret, Sam Lentz, Mark Seastrand, David Spencer, Brent Sumner. The motion **passed unanimously**.

Mr. Sumner **moved** to approve the January 26, 2016, City Council meeting minutes. Mr. Lentz **seconded** the motion. Those voting aye: Richard F. Brunst, Debby Lauret, Sam Lentz, Mark Seastrand, David Spencer, Brent Sumner. The motion **passed unanimously**.

MAYOR'S REPORT/ITEMS REFERRED BY COUNCIL

Upcoming Events

The Mayor referred the Council to the upcoming events listed in the agenda packet. A ribbon cutting for Advanced Auto Parts would be taking place on February 13, 2016, at 1484 North State Street. He noted that the time had been changed to 10:00 a.m. The Utah League of Cities and Towns Midyear Convention had been scheduled for April 6-8, 2016, at the Dixie Center in St. George.

Appointments to Boards and Commissions

Mr. Seastrand **moved** to reappoint Garr Judd and Keith White to the Transportation Advisory Commission. Mrs. Lauret **seconded** the motion. Those voting aye: Richard F. Brunst, Debby Lauret, Sam Lentz, Mark Seastrand, David Spencer, Brent Sumner. The motion **passed unanimously**.

Recognition of New Neighborhoods in Action Officers

Mr. Hirst introduced the Mountain View Youth Football team, who had recently participated in the State Championship games. The team's Head Coach stated that this was the first time their team had been able to accomplish the feat of taking the championship in the A Division in over a decade. He expressed appreciation for the youth leaders on and off the field, and was excited to introduce the athletes to the City leaders.

The Mayor asked the players to come up and shake hands with the City Council members, and took a photograph with the team.

PROCLAMATION – National FCCLA Week

Mayor Brunst read the following Proclamation for National FCCLA Week:

Whereas Family Career and Community Leaders of America, the national nonprofit family-focused student organization for family and consumer sciences students through grade twelve, helps youth assume the their roles in society through family and consumer sciences education and areas of personal growth, of family life, of vocational preparation, of college readiness, of leadership, and of community involvement. And whereas the organization extends classroom

learning through chapter projects that develop leadership and initiative, and helps young men and women learn how to plan, make decision, and carry out, and evaluate programs of action as they work with other youth and adults in their school and community. And whereas Family Career and Community Leaders of America offers members an opportunity to work together for common purposes, for the improvement of themselves, their families, and their communities. And whereas the week of February 7th through February 13th, 2016, has been designated National FCCLA week, with the theme "Empower". Now therefore I, Richard F. Brunst, Jr., Mayor of the City of Orem in Utah, do hereby designate February 7 through 13, 2016 as the national FCCLA Week in the City of Orem, and encourage all citizens to acquaint themselves with the activities and values of Family Career and Community Leaders of America, to show interest in it, and to give help and encouragement to the young men and women who are working to achieve knowledge and experience that will help prepare them for their future responsibilities as active and concerned adult members of society. Dated this 9th day of February, 2016.

Mr. Spencer **moved** to accept the proclamation. Mr. Seastrand **seconded** the motion. Those voting aye: Richard F. Brunst, Debby Lauret, Sam Lentz, Mark Seastrand, David Spencer, Brent Sumner. The motion **passed unanimously**.

REPORT – Beautification Advisory Commission

Sean Orullian, a member of the Beautification Advisory Commission, introduced fellow members Gayla Muir, Jim Campbell, and Carol Manwaring, and stated that other members would be joining them shortly. Mr. Orullian thanked the Council for the opportunity to serve the community. The mission statement of the Commission is:

> *The Beautification Commission serves as an essential component in making Orem a great City. We work to help our fellow citizens and business owners understand and do their part in making Orem a more beautiful and appealing place to live. We recognize and support those individuals who strive to do their part.*

Mr. Orullian then listed some of the Commission's accomplishments of 2015, including the addition of three new members, their participation in the Arbor Day festivities and the Summerfest parade, the presentation of residential and business beautification awards, the initiation of the Adopt-a-Pot program, and continuation of the Hanging Flower Pot project, and holiday home decorating recognition. Mr. Orullian explained that they also started the UVU and Orem banner program, but the banners did not work as they planned, and UVU was currently working to make more weather-resistant banners to put up.

Ms. Muir explained the Beautification Award process, and presented photographs of several homes that received the award last year. The Commission believed that these beautiful yards and the awards inspire others neighbors to follow suit.

Chelsea Young, one of the newest members of the Commission, arrived to the meeting and updated the Council on the Adopt-a-Pot program. The City wanted to bring more life and greenery to the businesses along State and Center Streets, so the Commission approached various businesses and asked if they would be willing to pay $50 to adopt a pot to be placed in front of their business place. They would be given the pots and flowers, along with care instructions. In 2015, fourteen businesses participated in the program, and the Commission hoped for an

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additional fourteen businesses in the upcoming year. Ms. Young expressed appreciation for Cook's Nursery for the donations made to this program. Additionally, Mr. Orullian thanked Mr. Sumner for purchasing a pot for his business last year.

Ms. Young then updated the Council on the progress of the Hanging Flower Pot project, which has been in place for four years. Those flowers were also provided by Cook's Nursery.

Mr. Orullian stated that the Commission had been giving holiday home decoration recognition awards for a few years, with much success. He presented photographs of some of the homes that received awards this past year. Mr. Orullian then listed the Commission's goals for 2016, as follows:

1. Encourage methods and practices that increase civic pride and enhance the beauty of Orem.
2. Make recommendations for neglected or unsightly areas of the City.
3. Encourage residences, businesses and property owners to participate in spring and fall clean-up activities, partnering with Neighborhoods in Action groups.
4. Encourage business and citizen involvement in beautification efforts.
5. Recognize residential and business owners which have made contributions to the beautification of their properties.
6. Recruit new members to fill future vacancies on the commission.

Mr. Campbell, who would be finishing his term on the Commission shortly, expressed his gratitude for being able to serve the City in this capacity. He was grateful for those who had the vision of a more beautiful City, and for those who helped to make that a reality.

Mrs. Lauret stated that she has enjoyed meeting with the Commission, and admired their passion for the beautification of Orem City. She expressed a concern regarding the panhandling that was become more of a problem throughout the City. Ms. Manwaring stated that the Commission shares her concern, and they have conducted some research on possible solutions.

The Mayor requested a meeting with the Commission regarding this issue, and Mr. Davidson suggested that a member of the City Attorney's office be present as well.

CITY MANAGER'S APPOINTMENTS

Appointments to Boards and Commissions

There were no appointments to boards and commissions.

PERSONAL APPEARANCES

Time was allotted for the public to express their ideas, concerns, and comments on items not on the agenda. Those wishing to speak should have signed in prior to the meeting, and comments were limited to three minutes or less.

Daryl Hague, resident, expressed his opposition to the proposed high density apartment complex in the Sunset Heights neighborhood. Mr. Hague recently moved from his home in Cherry Hill

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because of negative effects of new high density apartment complexes in the area. These complexes created problems with overcrowding, traffic, and increased crime. Mr. Hague stated that the neighbors were not opposed to development, but they felt strongly that there were other options that would be a better fit for the area than high density. The neighbors had come together and developed seven alternative plans for development, and Mr. Hague offered to provide that information to anyone who was interested.

Shawna Theabald, resident, stated that she had loved living in Orem. As background information, Ms. Theabald stated that when Utah Valley University expanded, and the perimeter road was proposed to back right up against her property, she harbored great concerns. Ms. Theabald had grown to appreciate what the University had done to mitigate the negative impacts of the increased traffic and noise. However, student traffic was significantly different from high density residential traffic, as there was less traffic on weekends, holidays, and during the summer. Residential traffic would be consistent. Ms. Theabald then read from the City Municipal Code regarding student/family overlay zones, and argued that a high density complex did not fit into this description. She felt that protecting the existing neighborhoods should be the City's highest priority.

Bob Wright, resident, expressed his opposition to the potential agreement with Siemens Industries, stating that the agreement was premature and needed further study before it was authorized. Mr. Wright believed that City Administration had been stepping outside of their authority to hire outside consultants without the City Council's knowledge and then asking them to solve the problems that they caused at the expense of the taxpayer. He suggested that the item be cancelled or tabled for further research.

CONSENT ITEMS

There were no Consent Items.

SCHEDULED ITEMS

<u>RESOLUTION – Siemens Industry, Inc. Agreement Authorizing the Mayor, or his designee, to execute:</u>

1. <u>A Performance Contracting Agreement between the City and Siemens Industry, Inc., pertaining to the installation of several Facility Improvement Measures (FIMs) designed to significantly reduce the City's energy consumption; and</u>
2. <u>A Master Lease Purchase Agreement associated Leasing Schedule and an Escrow Agreement with Siemens Public, Inc., with regard to the financing of the Equipment that will be installed as part of the FIMs; and authorizing the taking of all other actions necessary to the consummation of the transactions contemplated by such documents.</u>

Siemens Industry, Inc. performed an energy savings audit of the City's buildings and other facilities to identify opportunities to realize energy savings from upgrades to City facilities. As part of the audit, Siemens analyzed City street lights, building lights, heating and cooling systems, temperature settings and controls, operating hours, swimming pool operations, building insulation, windows, boilers and other elements of City facilities.

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The audit performed by Siemens identified a number of Facility Improvement Measures (FIMs) that could be implemented to generate energy savings for the City. The proposed FIMs include the following:

1. Street Lighting Upgrades
2. Building Lighting Upgrades and Control
3. Building Automation System Upgrade/Expansion
4. Elevator Upgrades
5. On-site Hypochlorite Generator
6. Pool Evaporation Control
7. Retro-Commissioning
8. Building Envelope and Mechanical Insulation
9. Fan Speed VFD Controls
10. Reduced Pool Circulation Pump Flow
11. Constant Volume to Variable Volume Pumping
12. Destratification Fans
13. Data Center Optimization, Hot Aisle Containment
14. Solar Shading of Windows
15. Boiler Replacement
16. Leisure Pool Pump Switch
17. Motor Replacements
18. Boiler Room Air Barrier
19. Increased Cooling Capacity

Siemens had calculated that implementation of the above-listed FIMs (all equipment or tangible items associated with the FIMs is hereinafter referred to as the "Equipment") would save the City at least 4,491,395 kWh of electric energy and 83,473 therms of natural gas every year. Installation of the FIMs would also generate operational savings in the form of reduced maintenance. Based on current electricity and natural gas rates and the anticipated increase in these rates over time, Siemens estimated that the energy and operational savings would save the City between $608,000 and $893,000 every year with savings in the initial years in the lower end of the range and increasing over time to the higher end of the range. The total average savings over the fifteen year period following installation of the FIMS would be approximately $759,000 per year.

The City and Siemens had negotiated a contract (the "Siemens Contract") in which Siemens agreed to install the agreed-upon FIMs within eighteen months. The contract contained a guarantee that the installed FIMs will generate the annual energy savings described above. The contract called for compensation to be paid to Siemens in the amount of $6,738,778 which would be paid in progress payments as work under the contract was completed.

In order to pay for the installation of the FIMs, the City proposed to enter into a Master Lease Purchase Agreement, associated Leasing Schedule and Escrow Agreement (collectively referred to as the "Lease Agreement") with Siemens Public, Inc., which was essentially the finance arm of Siemens (for ease of reference, Siemens Industry will hereinafter be referred to as "Siemens Construction" and Siemens Public will be referred to as "Siemens Finance"). The City solicited and reviewed proposals from several qualified firms regarding the funding of the Siemens

Contract and ultimately selected the proposal of Siemens Finance as the most advantageous to the City.

Under the Lease Agreement, Siemens Finance will deposit the sum of $6,738,778 (the contract price) into an escrow account from which progress payments will be made to Siemens Construction until all the work has been completed and the contract price is paid in full. The City will then make monthly lease payments to Siemens Finance over a period of fifteen years. The lease payments will be made out of savings that the City will realize from the installation of the FIMs.

During the term of the lease, Siemens Finance will have a security interest in the Equipment and will have the right to repossess the Equipment in the event the City does not make the lease payments. At the end of the fifteen years, the lease will be terminated and clear title to all of the Equipment will be conveyed to the City free and clear of any liens (not unlike a "lease to own" contract).

The City's obligation to make the lease payments was subject to annual appropriation by the City Council. The City Council may, in any year, elect not to appropriate funds to make the lease payments, but Siemens Finance would then have the right to repossess the Equipment pursuant to its security interest.

This item contained two parts. The first part was a request that the City Council authorize the Mayor or his designee to execute the Performance Contracting Agreement between the City and Siemens Construction for the installation of the FIMs. The second part was a request that the City Council authorize the Mayor or his designee to execute the Master Lease Purchase Agreement, associated Leasing Schedule and an Escrow Agreement with Siemens Public, Inc., related to the financing of the Equipment.

The Department of Administrative Services requested that the City Council authorize the Mayor, or his designee, to execute

1. A Performance Contracting Agreement between the City and Siemens Industry, Inc., pertaining to the installation of several Facility Improvement Measures (FIMs) designed to significantly reduce the City's energy consumption; and
2. A Master Lease Purchase Agreement, associated Leasing Schedule and an Escrow Agreement with Siemens Public, Inc., with regard to the financing of the Equipment that will be installed as part of the FIMs; and authorizing the taking of all other actions necessary to the consummation of the transactions contemplated by such documents.

Mr. Bell said it was a pleasure to be before the City Council to bring their recommendation for approval on these resolutions. They had been working long and hard on this project, and it could potentially save the City close to $50,000 per month in energy savings.

Mark Cram stated that much of the information he would be presenting will be a review for the City Council, as they have been informed of the progress of this agreement several times previously. He then presented a list of measures they would be taking and the subsequent savings for the City, and confirmed that this information had been validated and verified. By State statute, projects of this nature were required to be cash flow positive and budget neutral to the

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City. In other words, no new dollars would be allocated to the project from the City, but it would be funded by the savings generated by the measures that were performed.

Mr. Cram then presented a list of items that were considered in conjunction with the project, although some were not recommended. He showed this list so that the Council and the public could see that additional items were investigated and analyzed beyond the actions that would be taken.

Next, Mr. Cram presented the proposed cash flow, and indicated that the annual interest rate was shown below that chart. Closing was anticipated to be around February 19, 2016, at which point the interest rate would be locked. Mr. Cram noted that Siemens guaranteed success, and if those savings were not realized then Siemens would pay the difference financially. The company has had a 99.3 percent success rate.

Mayor Brunst asked if the savings realized would then be used to make payments against the financing over the fifteen year time period, and if the savings would go straight to the City after that time period was over. Mr. Cram confirmed that this was correct. There would be a construction period of eighteen months, and then the lease would continue for the next thirteen and a half years.

Mr. Seastrand asked if this was the first time the City had entered into an agreement of this nature, and if it was successful. Mr. Bell responded that they had entered into an agreement three or four years ago where the Obama Administration gave close to $1 million for energy improvements, which was mostly used to replace the heating and air systems in the City Center.

Mr. Lentz asked if the projects that were not currently being considered, such as solar panels, could be anticipated in another phase. Mr. Bell responded that there was a possibility for secondary projects, if it was cost effective for the City at that time. Mr. Lentz then asked if other Cities had done multiple phases, and Mr. Cram stated that Salt Lake City was currently on Phase Five of their program. He also informed them that Salt Lake City was seeing significant savings with each phase of the project.

Mr. Lentz asked staff what feedback they had received from the references provided by Siemens Industries. Mr. Bell gave the names of some of the people with whom he had spoken, and which cities they represented, and stated that he had received no negative feedback.

Mr. Sumner asked who would be on the hook if the deal went south.

Mr. Earl asked for clarification on the question. Mr. Sumner asked who would make the payment if there was a misunderstanding or if they locked heads. Mr. Earl said the City was responsible for final payment. Mr. Earl stated that under the Escrow Agreement, the City was obligated to make monthly lease payments. He indicated that the City was setting this up as a lease so the City would actually be leasing the equipment and making monthly lease payments until it was paid off in full after 15 years. The City was dealing with two separate entities. Although they were both Siemens, one was Siemens Public which was the finance arm and the other was Siemens Industry which was the entity that would be installing the equipment. Under the Escrow Agreement, the City had an obligation to always make the lease payments. If something did not

go right with the installation of the equipment, if the equipment was faulty or there was bad installation, then the City had remedies under the agreement with Siemens Industry. There were warranties on the equipment and they were warrantying the labor that the equipment would be installed in a workmanlike manner and so if something went wrong, the City's remedy would be against Siemens Industry to fix whatever problems might exist. But in any event, the City had to make the lease payments.

Mr. Earl stated that there was one caveat; that because this was a lease, it was subject to annual appropriation of funds by the City Council to make those lease payments. So the City Council could theoretically decide not to appropriate funds to make the lease payments. The problem with that was that Siemens Public had a security interest in all the equipment and so if that were to happen, they would have the right to come in and repossess it.

Mr. Sumner asked if the City would still be on the hook for the loan in such a case. Mr. Earl replied that at that point the City would not. Mr. Earl stated that if the City Council said "we do not like what we got for whatever reason and we do not want to continue making payments on the lease", the City Council could decide not to appropriate funds. At that point the City did not have to make any more lease payments at all.

Mr. Sumner asked if that would affect the City's credit. Ms. Lewis responded that she would certainly encourage the City not to do that. Mr. Earl added that that would obviously be a mess if the City had to take out the lights and it was not something that anybody anticipated was going to happen, but it was a possibility.

Mr. Sumner expressed concerns for the LED street lighting installation and the affect if would have on the citizens. LED lighting could be either too bright or not bright enough. He was also concerned about turning all of the energy saving responsibility to Siemens.

In response to Mr. Sumner's comments, Mr. Bell stated that the City was almost entirely lit by streetlights currently, and those lights would be replaced by LED lighting. It would not be as if the neighborhoods were going from no lighting to bright LED lighting, which would be more startling. Mr. Sumner suggested that they test the LED lighting on small areas of the City rather than replacing the entire City's lighting at once. Mr. Bell stated that there were already some areas of the City that were lit by LEDs, and they had not received any complaints.

Mr. Spencer commented that usually when something sounded too good to be true, it probably was. He had heard a lot of pros to this agreement, but wanted to know what the cons would be as well. Mr. Bell responded that a con to this would be that the City has to spend money in order to save money. The only other con he could see was the length of the lease agreement.

Mr. Davidson agreed that they would have to spend some money, but they would be contracting with a private firm to pay their fee. Some might suggest that the City could do the improvements independent of a contractor, but the proposed rollout time of twelve to eighteen months was far better than what the City could do alone. Mr. Davidson commented that another con would be that it was impossible to predict the future, and it was uncertain what would happen to the various facilities involved in this project, or what new technologies may come about in the

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meantime. But he felt that it would be foolish to forfeit such substantial savings while waiting for another solution.

Mr. Seastrand asked if the City would see other savings beyond the energy savings, which began a discussion regarding the lifetime of the LED lights and how much could be saved on replacement costs. Mr. Bell stated that these other types of savings were calculated into the $50,000 savings calculation.

Mr. Seastrand asked if there would be a greater savings if the energy costs went up in the future. Mr. Cram replied that there would. He referred to the escalation rates in the contract and noted that this was exactly what Mr. Seastrand was talking about. Mr. Cram stated that Siemens agreed with City staff as to what would be reasonable although these were conservative escalation rates. He said that if they utilized escalation rates that were closer to what the utilities were doing, it would generate more savings. But Siemens liked to err on the side of caution so the rates that were shown were proven over the last six years to be very conservative escalation rates.

Mr. Seastrand asked if the rates came in at that 3.5 percent then it was basically as planned. He asked if Siemens would make up the difference if the rate increases came in less and generated less of a savings.

Mr. Cram said there was a caveat to that. The savings were based on kilowatt hours, gallons of water, and decatherms of natural gas and not based on dollars. Historically, the escalation rates had been higher so Orem would see more savings. Siemens had not had a situation where the energy rates had not gone up that quickly.

Mr. Earl said that this was something he looked at closely when he was doing his review of the contract and that the savings that were being projected were actually dependent on the rates going up by at least that amount (the amount shown in the contract). If it was less, that was actually one of the risks—that the City would not realize the same amount of savings if those utility rates did not go up at least that amount. Mr. Earl stated that he went back and looked at natural gas and electricity rates over the last twenty years to see if they had historically gone up by those amounts and in fact they had gone up by at least those amounts. He said the past was no guarantee of what might happen in the future, but it was at least some indication that historically those rates had increased by that amount.

Ms. Lewis explained that the staff examined six different bids for this project, and Siemens was the lowest by close to seventeen basis points. Separate and apart from their services, their financing was more feasible than the other companies.

Mr. Lentz agreed that they would be transferring the energy saving responsibility to Siemens, but he was not as concerned because they were the experts in this situation.

There was a conversation regarding the difference in cost if the City chose to make the improvements independently rather than contract with Siemens. Mayor Brunst felt that the costs were relatively the same, but the timeframe would be much longer if the City did this alone. The construction time with Siemens would be eighteen months, while it would take the City three or four years to construct. Mr. Bell added that Siemens offered the savings guarantee, which the

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City would not have done otherwise. There was then another discussion regarding the LED lighting versus the costs of their current lighting system.

Mrs. Lauret asked for Ms. Lewis's opinion regarding the lease agreement language. Ms. Lewis stated that there was nothing unusual in the lease, and the terms were reasonable. Staff spent a lot of time working through any potentially difficult legal issues, and they felt confident with the agreement as it was now.

Mayor Brunst commented that he found the agreement to be advantageous and felt that it would be beneficial to the City. However, Mr. Sumner felt that he had not been given sufficient time to review the lease and other documents provided by Siemens, and suggested that the item be continued for two weeks. He also felt that they needed more information from the other cities that had entered into agreements with Siemens. Mr. Sumner asked if a continuation would create any foreseeable issues with the agreement.

Ms. Lewis responded by stating that there could be a change in the interest rate up to two days before the closing date. However, she did not feel that any change would be too significant. Siemens had also guaranteed the proposed pricing for a certain amount of time, and Ms. Lewis was unsure of when that time period would end. Kevin Brown stated that they had seen an increase in the costs every day that they have waited on this, but they have been absorbing this increase for the past six months.

Mr. Davidson addressed a comment made by Mr. Sumner, stating that a pay-as-you-go agreement would be predicated on setting money aside to pay for things as you move forward. In this circumstance, the City had not set aside any money which left them with few options if something needed replacing. The best solution the City had at this point was to enter into a financial agreement with a company like Siemens. Ms. Lewis added that this was a unique situation in which the lease was paid out of the energy savings, but the City would not see those savings until the equipment was installed.

Mr. Lentz stated that conversations on this subject had been going on for over a year. If the Council was not comfortable in turning things over to Siemens now, that would not change in two weeks' time. Mr. Sumner responded that he wanted more time to adequately review the information given.

Mr. Lentz **moved**, by resolution, to authorize the Mayor or his designate to execute a performance contracting agreement between the City and Siemens Industry Inc., and a Master Lease Purchase Agreement, associated Leasing Schedule, and an Escrow Agreement with Siemens Public Inc. Mrs. Lauret **seconded** the motion. Those voting aye: Debby Lauret, Sam Lentz. Those voting nay: Mark Seastrand, Mayor Brunst, Brent Sumner, David Spencer. The motion **failed**.

Mr. Seastrand **moved** that they continue the decision to the City Council meeting on February 23, 2016. Mayor Brunst **seconded** the motion. Those voting aye: Debby Lauret, Mark Seastrand, David Spencer, Brent Sumner, Mayor Brunst. Those voting nay: Sam Lentz. The motion **passed**.

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Mr. Davidson asked for clarification on what the Council needed before the next City Council meeting, so that the applicants could be prepared. The Council requested more information on the lights themselves, and the locations where those had already been installed. They also clarified that they needed additional time to review the agreement and other documents provided.

Mayor Brunst again voiced his support of the agreement, and hoped that a resolution could be made at the next meeting.

RESOLUTION – Amending the policies and procedures for city option funding of recreational and cultural facilities and cultural organizations known as the CARE program

Mr. Steven Downs, Assistant to the City Manager, presented a recommendation that the City Council, by resolution, approve the resolution updating the CARE Policies and Procedures.

The existing CARE policies and procedures were most recently adopted on December 9th, 2008. Since that time, Orem voters renewed the CARE tax for an additional 10 years, keeping the CARE tax in effect through March 31, 2024, and thus requiring changes to reflect the effective dates.

The updated policies and procedures also reflected the creation of a mid-major CARE group which allowed organizations that would otherwise qualify for a mini grant, but had an active 501(c)(3) designation, to qualify for a grant between $5,000 and $9,999. This also moved the lower bound of a major grant from $5,000 to $10,000.

Additional changes were made to reflect changes to State code as well as eliminate the restrictive language used to define the various disciplines allowed to be funded with CARE funding.

Mr. Downs stated that update to the CARE policies and procedures were a reflection of changes recently made to the State Code. As a brief overview, Mr. Downs stated that they were projecting $1.96 million in CARE funding, and all revenue would be split evenly between the Cultural Arts and Recreation, with 1.5 percent of that going toward Administration. Mr. Downs also stated that the new applications would be going out on Thursday, and would be due in March. Also, they had come up with criteria that an organization would need to meet to qualify for a mid-major grant allocation. One of the major changes was that the organization must be designated a 501(c)(3) with the IRS. Additionally, the organization must be managed and present in Orem City. Mr. Downs continued by stating that the mid-major grant amount would be between $5,000 and $9,999, and the major grant minimum amount was increased to $10,000. Additionally, some restrictive language was removed from certain definitions in the policy.

Mayor Brunst asked about the eliminated language, and Mr. Downs responded that the language was removed or simplified so that the Council did not feel restricted by what was specifically listed in the CARE policy.

Mrs. Lauret asked for clarification on the requirement for the organization to be managed or present in the City. Mr. Downs explained that previously some groups were based in Lindon or Pleasant Grove, but performed in Orem, and they received grant money. This language would require the organization to actually be in the Orem to receive funds.

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Mr. Seastrand expressed a concern with the mid-major category. One designation with major grants was that there were expenses tied to operational costs, disqualifying them from more than 35 percent funding from CARE. The intent was that the CARE tax could not be their primary source of revenue. The mini grants did not have the limitation. Mr. Seastrand felt that the only difference between a mid-major and major grant was the 501(c)(3) designation.

Mr. Downs stated that the request for the change to the policy was initiated by City Council members who felt some of the mini grant recipients could use more funding, but did not meet the major grant requirements. Mr. Seastrand was concerned that many of the mini grant recipients would now apply for a 501(c)(3) status and seek more money; because there were no other qualifications specified for the mid-major grant, the City Council would have to objectively decide who was awarded these grants.

Mr. Seastrand continued by stating that part of the reason for the CARE tax allocation was for the organizations to grow and become more self-sufficient. He felt that the organizations should provide evidence of other funding in order to qualify for the mid-major grant.

Mayor Brunst felt that the mid-major category would be helpful to the City's organizations.

Mrs. Lauret **moved**, by resolution, to amend the policies and procedures for City option funding of recreational and cultural facilities and cultural organizations known as the CARE program. Mayor Brunst **seconded** the motion. Those voting aye: Mayor Brunst, Debby Lauret, Sam Lentz, Mark Seastrand, David Spencer, Brent Sumner. The motion **passed unanimously**.

COMMUNICATION ITEMS

The Monthly Financial Summary for November 2015 was provided to the Council.

CITY MANAGER INFORMATION ITEMS

There were no City Manager information items.

ADJOURNMENT

Mr. Spencer **moved** to adjourn to the meeting. Mr. Seastrand **seconded** the motion. Those voting aye: Richard F. Brunst, Debby Lauret, Sam Lentz, Mark Seastrand, David Spencer, Brent Sumner. The motion **passed unanimously**.

The meeting adjourned at 8:03 p.m.

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CITY OF OREM
CITY COUNCIL MEETING
56 North State Street Orem, Utah
February 23, 2016

3:00 P.M. WORK SESSION – PUBLIC SAFETY TRAINING ROOM

CONDUCTING	Mayor Richard F. Brunst
ELECTED OFFICIALS	Councilmembers Debby Lauret, Sam Lentz, Tom Macdonald, Mark Seastrand, David Spencer, and Brent Sumner
APPOINTED STAFF	Jamie Davidson, City Manager; Brenn Bybee, Assistant City Manager; Greg Stephens, City Attorney; Richard Manning, Administrative Services Director; Bill Bell, Development Services Director; Karl Hirst, Recreation Director; Chris Tschirki, Public Works Director; Scott Gurney, Fire Department Director; Gary Giles, Police Department Director; Charlene Crozier, Library Director; Jason Bench, Planning Division Manager; Neal Winterton, Water Division Manager; Reed Price, Maintenance Division Manager; Steven Downs, Assistant to the City Manager; and Donna Weaver, City Recorder

DISCUSSION – Draft Sewer Utility Master Plan

Mr. Winterton reviewed the process the sewer system used, noting that it ended in Powell Slough. He touched on the history of the sewer plant and statistics on the amount of sewage it processed and the infrastructure needed to handle it. He noted the City had a TV truck that dropped a camera into a pipe "real time" to visually inspect the condition of a line. Sometimes they found that the condition of the pipe had degraded and holes had developed.

Mr. Davidson said a steamroller working on a project on 1200 North ended up inside a pipe that collapsed.

Mr. Winterton said his staff had been utilizing public education to help people understand that they should throw things in the trash rather than down the sewer. He reviewed a chart of future system improvements, including a slide with the 5-, 7-, 10-year, and bond scenarios.

He said there were more sophisticated technology options to assess pipe condition and life expectancy. The plans were to maintain capacity; they were not looking at evaluating increasing capacity until 2040. Should there be another incident like what happened on 1200 North they had a reserve fund which required approval of the Council through a budget amendment.

Mr. Winterton then reviewed how the sewer utility was funded and the timing for the proposed rate increases. He mentioned something called a "pass-through" cost. Mr. Tschirki said an example of one was the City's Jordanelle payment for treatment and access to "wet" water.

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DISCUSSION/UPDATE – Utility Rate Options

At the request of Mr. Davidson, Mr. Winterton explained what they were doing to minimize "sewer bursts" at the Wastewater Treatment Plant. They were working to limit odors and were preparing an online notification process similar to the one used for potholes.

Mr. Davidson said that the retreat discussion had included financing some of the larger projects.

Mr. Tschirki said they had not previously included a bonding option but did so at the request of some of the Council members. He said the cost to bond would be in the neighborhood of $12 million. The benefit in doing it would be the ability to complete some projects sooner.

Mayor Brunst said he understood that doing the 10-year option meant some projects simply could not be done. Mr. Tschirki said prioritization of projects would determine what projects were done, and when. Mayor Brunst requested that a chart be prepared showing projects could be done/not done, depending upon the funding source adopted.

Mr. Tschirki then reviewed the timing of the projects depending upon which funding source the Council chose.

Water

Increase In Monthly Bill
From Prior Year (Bond)

- $2.83 Average
- 2018 Water Bond
  - P = $12.5M
  - Costs = $6.3M
  - AP = $943k
  - 2021 Water Bond
  - P = $12.5M
  - Costs = $6.3M
  - AP = $943k

5-year	Bond	7-year	10-year	Open House
-	-	-	-	-
$9.90	$6.48	$8.01	$7.50	$7.63
$4.97	$2.10	$2.66	$1.92	$7.49
$3.67	$2.00	$3.18	$2.40	$3.75
$1.89	$2.48	$2.96	$2.48	$1.45
$1.90	$2.97	$3.16	$2.57	$1.78
$1.31	$2.46	$2.54	$2.66	$1.79
$1.33	$2.75	$1.99	$2.76	$1.33
$1.35	$3.01	$1.99	$2.63	$1.35
$1.24	$1.81	$1.37	$2.22	$1.24
$0.73	$2.23	$0.43	$1.15	$0.73

Sewer

Increase In Monthly Bill
From Prior Year (Bond)

- $2.46 Average
- 2018 Sewer Bond
  - P = $4.5M
  - I = $2.3M
  - AP = $339K
  - 2021 Sewer Bond
  - P = $7.5M
  - Costs = $3.8M
  - AP = $566k

5-year	Bond	7-year	10-year	Open House
-	-	-	-	-
$0.00	$0.00	$0.00	$0.00	$1.68
$5.68	$3.44	$3.44	$3.44	$5.29
$3.96	$2.69	$4.04	$2.88	$4.64
$3.95	$3.03	$4.41	$3.25	$4.12
$3.73	$2.97	$3.23	$3.01	$3.92
$1.87	$2.59	$2.57	$2.63	$0.95
$1.60	$2.70	$2.49	$2.59	$0.97
$1.24	$2.64	$1.73	$2.51	$1.00
$1.25	$2.61	$1.74	$2.49	$1.02
$1.35	$1.96	$0.98	$1.83	$1.04

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Storm Water
Increase In Monthly Bill
From Prior Year (5-year)
- $0.34 Average
- No Bonding Required

5-year	Bond	7-year	10-year	Open House
-	-	-	-	-
$1.00	$1.00	$0.70	$0.60	$1.37
$0.50	$0.50	$0.45	$0.40	$0.33
$0.35	$0.35	$0.45	$0.35	$0.21
$0.25	$0.25	$0.30	$0.30	$0.21
$0.25	$0.25	$0.30	$0.30	$0.23
$0.20	$0.20	$0.30	$0.30	$0.20
$0.20	$0.20	$0.25	$0.30	$0.20
$0.20	$0.20	$0.20	$0.30	$0.20
$0.20	$0.20	$0.20	$0.30	$0.20
$0.20	$0.20	$0.20	$0.20	$0.20

All Three
Increase In Monthly Bill
From Prior Year
- $5.63 Average
- 2018 Bond
  - P = $17.0M
  - Costs = $8.6M
  - AP = 1.3M
  - 2021 Bond
  - P = $20.0M
  - Costs = $10.1M
  - AP = 1.5M

5-year	Bond	7-year	10-year	Open House
-	-	-	-	-
$10.90	$7.48	$8.71	$8.10	$10.68
$11.15	$6.04	$6.55	$5.76	$13.11
$7.98	$5.04	$7.67	$5.63	$8.60
$6.09	$5.76	$7.67	$6.03	$5.78
$5.88	$6.19	$6.69	$5.88	$5.93
$3.38	$5.25	$5.41	$5.59	$2.94
$3.13	$5.65	$4.73	$5.65	$2.50
$2.79	$5.85	$3.92	$5.44	$2.55
$2.69	$4.62	$3.31	$5.01	$2.46
$2.28	$4.39	$1.61	$3.18	$1.97

In response to a query from the Mayor about a proposed new well, Keith Larson, consultant, said different water rights were needed at different times of the year. Mr. Tschirki said that, while surface water was currently the least expensive, it might not always be the case. Surface water was also limited by how much the Central Utah Water Conservancy District (CUWCD) water treatment plant could handle. More public education for conservation should be done. Legislature was looking at a conservation-minded tiered rate structure. The City does have a water conservation plan that was evaluated every five years but more could be done to educate the public.

DISCUSSION – City Council Items of Common Interest

Mayor Brunst provided time for Council members to report on their committee assignments.

Mayor Brunst then expressed concern about panhandling in Orem. He suggested looking at what Provo was doing. He said it should include an education process to help residents know how to handle panhandlers—besides residents giving them money out of their cars.

Mr. Stephens said there were probably things that could be done to Orem's ordinance. Most ordinances focused on safety issues and not on the panhandling itself. Provo's new approach was

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to criminalize both the panhandling and the resident giving the money. Orem's ordinance only penalized the panhandler. State law focused on any reason for going out in the street. Provo's law applied to larger streets, while Orem limited it to all streets. Courts had upheld that kind of law on the basis of safety reasons, but that meant it was hard to limit panhandling on a cul-de-sac. He noted there would be a lot of negative press about criminalizing it on the side of the person giving money. Mr. Stephens said he thought educating the public was the best way to cut down on panhandling.

Chief Giles said they came up with a form that listed all the different resources, and all his officers had the list in their cars. They also did a Facebook campaign in December with mixed reviews. Many people were happy something was being done while others had the attitude that they would give to whomever they wanted. Chief Giles said they discovered that a lot of the "homeless" were coming down on Frontrunner from the Salt Lake area. His officers were instructed that, when they did have some time, they should park near a panhandler. Because the panhandlers know they were not permitted to go into the road, their ability to get money was reduced and they tended to leave early.

Mr. Davidson said he was looking for a date in the future when he could introduce the Council to the new UTOPIA director and talk about opportunities for growth in the system.

5:00 P.M. STUDY SESSION – PUBLIC SAFETY TRAINING ROOM

CONDUCTING	Mayor Richard F. Brunst
ELECTED OFFICIALS	Councilmembers Debby Lauret, Sam Lentz, Tom Macdonald, Mark Seastrand, David Spencer, and Brent Sumner
APPOINTED STAFF	Jamie Davidson, City Manager; Brenn Bybee, Assistant City Manager; Greg Stephens, City Attorney; Richard Manning, Administrative Services Director; Bill Bell, Development Services Director; Karl Hirst, Recreation Director; Chris Tschirki, Public Works Director; Scott Gurney, Fire Department Director; Gary Giles, Police Department Director; Charlene Crozier, Library Director; Jason Bench, Planning Division Manager; Paul Goodrich, Transportation Engineer; Keith Larsen, Traffic Operations Engineer; Sam Kelly, Engineer; Neal Winterton, Water Division Manager; Reed Price, Maintenance Division Manager; Steven Downs, Assistant to the City Manager; and Donna Weaver, City Recorder

Preview Upcoming Agenda Items

Staff presented a preview of upcoming agenda items.

Agenda Review

The City Council and staff reviewed the items on the agenda.

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City Council New Business

There was no City Council new business.

The Council adjourned 5:49 p.m. to the City Council Chambers for the regular meeting.

6:00 P.M. REGULAR SESSION – COUNCIL CHAMBERS

CONDUCTING	Mayor Richard F. Brunst
ELECTED OFFICIALS	Councilmembers Debby Lauret, Sam Lentz, Tom Macdonald, Mark Seastrand, David Spencer, and Brent Sumner
APPOINTED STAFF	Jamie Davidson, City Manager; Brenn Bybee, Assistant City Manager; Greg Stephens, City Attorney; Richard Manning, Administrative Services Director; Bill Bell, Development Services Director; Karl Hirst, Recreation Director; Chris Tschirki, Public Works Director; Scott Gurney, Fire Department Director; Gary Giles, Police Department Director; Charlene Crozier, Library Director; Jason Bench, Planning Division Manager; Steven Downs, Assistant to the City Manager; and Donna Weaver, City Recorder
INVOCATION / INSPIRATIONAL THOUGHT	Kirk Topham
PLEDGE OF ALLEGIANCE	Eric Walkers

APPROVAL OF MINUTES

Mr. Sumner **moved** to approve the January 20, 2016, Joint City Council/Alpine School District meeting minutes. Mr. Macdonald **seconded** the motion. Those voting aye: Richard F. Brunst, Debby Lauret, Sam Lentz, Tom Macdonald, Mark Seastrand, David Spencer, Brent Sumner. The motion **passed unanimously.**

MAYOR'S REPORT/ITEMS REFERRED BY COUNCIL

Upcoming Events

The Mayor referred the Council to the upcoming events listed in the agenda packet.

Appointments to Boards and Commissions

There were no appointments to boards and commissions.

Recognition of New Neighborhoods in Action Officers

There were new NIA officers recognized.

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CITY MANAGER'S APPOINTMENTS

Appointments to Boards and Commissions

There were no appointments to boards and commissions.

PERSONAL APPEARANCES

Time was allotted for the public to express their ideas, concerns, and comments on items not on the agenda. Those wishing to speak should have signed in prior to the meeting, and comments were limited to three minutes or less.

Mark Tippets, resident of the Sunset Heights Neighborhood, proposed an alternative to the Ivory Homes project being planned for his neighborhood. He said they would prefer the developer it consider a married housing option. Mr. Tippets noted that not all his neighbors had bought off on the idea yet because they have not all been contacted yet, though it would not be as high density as the current proposal, it would have a steadier clientele with fewer vacancies during the summer months. The traffic impact on the neighborhood would also be less.

CONSENT ITEMS

RESOLUTION – Authorizing the City Manager to Transfer $6,500 from the City Council Contingency Account to Fund Council participation in the upcoming Pillar of the Valley and SCERA Gala events.

Mayor Brunst **moved**, by resolution, to authorize the City Manager to Transfer $6,500 from the City Council Contingency Account to fund Council participation in the upcoming Pillar of the Valley and SCERA Gala events. Mr. Lentz **seconded** the motion. Those voting aye: Richard F. Brunst, Debby Lauret, Sam Lentz, Tom Macdonald, Mark Seastrand, David Spencer, Brent Sumner. The motion **passed unanimously**.

SCHEDULED ITEMS

CONTINUED DISCUSSION - RESOLUTION – Siemens Industry, Inc. Agreement Authorizing the Mayor, or his designee, to execute:

1. A Performance Contracting Agreement between the City and Siemens Industry, Inc., pertaining to the installation of several Facility Improvement Measures (FIMs) designed to significantly reduce the City's energy consumption; and
2. A Master Lease Purchase Agreement associated Leasing Schedule and an Escrow Agreement with Siemens Public, Inc., with regard to the financing of the Equipment that will be installed as part of the FIMs; and authorizing the taking of all other actions necessary to the consummation of the transactions contemplated by such documents.

Siemens Industry, Inc. performed an energy savings audit of the City's buildings and other facilities to identify opportunities to realize energy savings from upgrades to City facilities. As part of the audit, Siemens analyzed City street lights, building lights, heating and cooling systems, temperature settings and controls, operating hours, swimming pool operations, building insulation, windows, boilers and other elements of City facilities.

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The audit performed by Siemens identified a number of Facility Improvement Measures (FIMs) that could be implemented to generate energy savings for the City. The proposed FIMs include the following:

1. Street Lighting Upgrades
2. Building Lighting Upgrades and Control
3. Building Automation System Upgrade/Expansion
4. Elevator Upgrades
5. On-site Hypochlorite Generator
6. Pool Evaporation Control
7. Retro-Commissioning
8. Building Envelope and Mechanical Insulation
9. Fan Speed VFD Controls
10. Reduced Pool Circulation Pump Flow
11. Constant Volume to Variable Volume Pumping
12. Destratification Fans
13. Data Center Optimization, Hot Aisle Containment
14. Solar Shading of Windows
15. Boiler Replacement
16. Leisure Pool Pump Switch
17. Motor Replacements
18. Boiler Room Air Barrier
19. Increased Cooling Capacity

Siemens had calculated that implementation of the above-listed FIMs (all equipment or tangible items associated with the FIMs is hereinafter referred to as the "Equipment") would save the City at least 4,491,395 kWh of electric energy and 83,473 therms of natural gas every year. Installation of the FIMs would also generate operational savings in the form of reduced maintenance. Based on current electricity and natural gas rates and the anticipated increase in these rates over time, Siemens estimated that the energy and operational savings would save the City between $608,000 and $893,000 every year with savings in the initial years in the lower end of the range and increasing over time to the higher end of the range. The total average savings over the 15-year period following installation of the FIMS would be approximately $759,000 per year.

The City and Siemens had negotiated a contract (the "Siemens Contract") in which Siemens agrees to install the agreed-upon FIMs within 18 months. The contract contained a guarantee that the installed FIMs will generate the annual energy savings described above. The contract calls for compensation to be paid to Siemens in the amount of $6,738,778 which will be paid in progress payments as work under the contract is completed.

In order to pay for the installation of the FIMs, the City proposed to enter into a Master Lease Purchase Agreement, associated Leasing Schedule and Escrow Agreement (collectively referred to as the "Lease Agreement") with Siemens Public, Inc., which was essentially the finance arm of Siemens (for ease of reference, Siemens Industry will hereinafter be referred to as "Siemens Construction" and Siemens Public will be referred to as "Siemens Finance"). The City solicited and reviewed proposals from several qualified firms regarding the funding of the Siemens

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Contract and ultimately selected the proposal of Siemens Finance as the most advantageous to the City.

Under the Lease Agreement, Siemens Finance will deposit the sum of $6,738,778 (the contract price) into an escrow account from which progress payments will be made to Siemens Construction until all the work has been completed and the contract price is paid in full. The City will then make monthly lease payments to Siemens Finance over a period of fifteen years. The lease payments will be made out of savings that the City will realize from the installation of the FIMs.

During the term of the lease, Siemens Finance will have a security interest in the Equipment and will have the right to repossess the Equipment in the event the City does not make the lease payments. At the end of the fifteen years, the lease will be terminated and clear title to all of the Equipment will be conveyed to the City free and clear of any liens (not unlike a "lease to own" contract).

The City's obligation to make the lease payments was subject to annual appropriation by the City Council. The City Council may, in any year, elect not to appropriate funds to make the lease payments, but Siemens Finance would then have the right to repossess the Equipment pursuant to its security interest.

This item contained two parts. The first part was a request that the City Council authorize the Mayor or his designee to execute the Performance Contracting Agreement between the City and Siemens Construction for the installation of the FIMs. The second part was a request that the City Council authorize the Mayor or his designee to execute the Master Lease Purchase Agreement, associated Leasing Schedule and an Escrow Agreement with Siemens Public, Inc., related to the financing of the Equipment.

Mark Cram, Siemens representative, said the proposed savings represented were for the entire length of the project. The dollars could vary depending upon the utility rates.

Mr. Seastrand said labor was also a factor in saving and wondered how that had been measured. Mr. Cram said they had based it on what money had been previously spent on outside labor for repairs and materials. There would no longer be a need for replacements since the equipment would be new.

Mr. Davidson noted that some of the incentives that were currently being offered by Rocky Mountain Power would end. Mr. Cram said by that date was March 10, 2016. He indicated they were already set up to take advantage of those discounts if the contract were approved.

Mr. Spencer asked if Siemens had met their guarantee for the five cities they had already worked with. Mr. Cram said they had, but with one caveat. One of the phases with Salt Lake City had a main line break on a solar thermal system. During the repairs they did not realize the savings in the heating of the water. Siemens and the contractor reimbursed the city for those lost revenues.

Mr. Macdonald asked if Orem's proposal included any solar work, and Mr. Cram said it did not.

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Mayor Brunst said he had spoken with the references provided by Siemens. All the cities gave a good report and said the projected savings were there. He stated that he thought it was a good program.

Mr. Sumner noted that the other cities had not done an entire roll out as Orem was proposing to do. He asked about the reasoning for that. Mr. Bell said the savings would be realized more quickly and could be put toward other needs.

Mr. Lentz **moved**, by resolution, to authorize the Mayor or his designate to execute a performance contracting agreement between the City and Siemens Industry Inc., and a Master Lease Purchase Agreement, associated Leasing Schedule, and an Escrow Agreement with Siemens Public Inc. Mr. Macdonald **seconded** the motion. Those voting aye: Richard F. Brunst, Debby Lauret, Sam Lentz, Tom Macdonald, Mark Seastrand, Brent Sumner, David Spencer. The motion **passed unanimously**.

6:00 P.M. PUBLIC HEARING – Storm Water Utility Fee Increase
RESOLUTION – Adjusting the storm sewer fee per equivalent service unit (ESU) from $5.25 per ESU to $6.25 per ESU to fund capital improvements identified in the recently adopted 2016 Storm Water Master Plan

Reed Price said that almost one month ago, on January 26, 2016, the Orem City Council unanimously approved Resolution R-2016-003 adopting the 2016 Storm Water Master Plan (SWMP) prepared by Bowen Collins & Associates, Inc. That action culminated nearly two years of study and planning which included several presentations to the Council, input from the Public Works Advisory Commission, and numerous efforts to inform the public, including two open houses, several reports in the local newspaper, information in city newsletters and direct mailings to residents, regular social media notices, and a website with up-to-date information. The SWMP formalizes the City's strategy to construct needed improvements to resolve existing and projected future deficiencies in the City's storm water system and to remove sumps from drinking water wellhead protection zones by piping water away from those areas.

The resolution also accepted the associated Storm Water User Rate Study (SWURS) prepared by Lewis Young Robertson & Burningham, Inc. (LYRB). After receiving public feedback and upon the recommendation of the City Council, LYRB created three pay-as-you-go funding plans over 5-, 7-, and 10-year periods.

The three rate scenarios presented were all structured to produce a final rate of $8.60/ESU (a fee increase of $3.35/ESU) within ten years. Scenarios 2 and 3 fund a reduced CIP in order to allow for a more moderate annual increase in the rates. Scenarios 2 and 3 result in an overall approximate revenue reduction of $725,000 and $1.6 million, respectively, over the same 10-year period. The result was a delay in completion of capital facility projects and an on-going liability from a water quality and property damage perspective.

The SWURS also illustrated that without a strategy for rate increases over time, past approaches to rate adjustment relative to proposed expenses would not provide sufficient revenues to fund the needed capital improvements identified in the SWMP. Additional analysis showed that past rate increases had not kept up with inflation, meaning capital improvement projects had been

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funded at a rate lower than when the original master plan was adopted in 1998. General support for the 5-year rate adjustment option was offered at the meeting on January 26, 2016, as well as at the City Council retreat the following week.

At the request of the Mayor, Mr. Price reviewed the list of best management practices that businesses could use to qualify for a discount.

Mrs. Lauret asked when the billing increases would take place. Mr. Price said staff recommended April 1, 2016.

Mr. Macdonald said that almost twenty years ago a decision had been made to make increases to this fee every year; few had actually been done. He noted that even if the Council approved the proposal, the only increased that would be locked in would be for the next year.

Mr. Price agreed, saying the intent was to bring the issue before the Council on a regular basis, during the budget process. Mr. Tschirki said it would also provide an opportunity for staff to report on changes.

Mr. Seastrand said the real intent of the system was to get as much of the rain water back in the ground while protecting the wellheads from contaminated water. The City had a responsibility to handle the water from large storms which pavement and rooftops prevented water from getting back into the ground. Mr. Seastrand reaffirmed that the City would not be charging for the rain but for getting the water back in the ground in places where the water would not endanger the wells.

Mayor Brunst said when he moved to Orem twenty years ago, there were no detention basins or street lights. He said he thought it was an important program.

Mayor Brunst opened the public hearing.

Bob Wright, resident, said that he objected to the proposed $1 increase in the utility bill for storm water. The improvements should be made on an “as needed and prioritized basis.”

The Mayor closed the public hearing.

Mr. Lentz asked about the assessment for multiunit residences. Mr. Price reviewed some of the variations in billing and noted there were many unique structures in Orem. Some multifamily units were charged per unit while others, like larger complexes, were charged by the amount of impervious area. Mr. Lentz said he was not sure it would change the decision the Council would make tonight, but he would like to more clearly define—as with the sewer base rate—the differences between a single-family residence with an accessory apartment and a duplex, a fourplex, or a large complex.

Mr. Tschirki said they could do that and make recommendations based upon the amount of impervious surface. It would take time to do that.

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Mr. Macdonald **moved**, by resolution, to adjust the storm sewer fee per equivalent service unit (ESU) from $5.25 per ESU to $6.25 per ESU to fund needed capital improvements identified in the 2016 Storm Water Master Plan, effective April 1, 2016. Mrs. Lauret **seconded** the motion. Those voting aye: Richard F. Brunst, Debby Lauret, Sam Lentz, Tom Macdonald, Mark Seastrand, Brent Sumner, David Spencer. The motion **passed unanimously**.

Mr. Macdonald said a decision would have to be made about the 5-, 7-, and 10-year plan options.

Mayor Brunst said the motion just passed would be the 5-year plan, as outlined at this time.

COMMUNICATION ITEMS

The Monthly Financial Summary for January 2016 was provided to the Council.

CITY MANAGER INFORMATION ITEMS

At the request of the Mayor, Mr. Davidson noted the retirements of two members of the Streets Division, Stan Orme and John Fillmore. He expressed appreciation for their service to the city.

ADJOURNMENT

Mr. Sumner **moved** to adjourn to the meeting. Mr. Macdonald **seconded** the motion. Those voting aye: Richard F. Brunst, Debby Lauret, Sam Lentz, Tom Macdonald, Mark Seastrand, David Spencer, Brent Sumner. The motion **passed unanimously**.

The meeting adjourned at 7:00 p.m.

Commission Appointments

Beautification Advisory Appointments

First Review by Council

Sally Taylor

Library Advisory Appointments

First Review by Council

Chitralekha Duttagupta

CITY OF OREM **CITY COUNCIL MEETING** MARCH 8, 2016	
REQUEST:	**6:10 P.M. PUBLIC HEARING – REZONE PD-22 AND R8 TO HS ZONE – 1045 NORTH 1200 WEST** **ORDINANCE – Amending the General Plan by changing the land use designation on approximately 0.47 acres from Low Density Residential (LDR) to Regional Commercial (RC) and amending Section 22-5-3(A) and the zoning map of the City of Orem by rezoning approximately 1.83 acres of property located at 1045 North 1200 West from the PD-22 and R8 zones to the Highway Services (HS) zone**
APPLICANT:	Boyd Brown
FISCAL IMPACT:	None

NOTICES:
-Posted in 2 public places
-Posted on City webpage
-Posted on the State noticing website
-Faxed to newspapers
-E-mailed to newspapers
-Mailed 514 notifications to properties within the 1,000' of the subject property and all properties in the PD-22 zone on February 9, 2015

SITE INFORMATION:
General Plan Designation:
Regional Commercial and Low Density Residential
Current Zone:
R8 & PD-22
Acreage:
1.83
Neighborhood:
Timpview
Neighborhood Chair:
N/A

PLANNING COMMISSION RECOMMENDATION
4-0 for Approval

PREPARED BY:
Clinton A. Spencer Planner

REQUEST:
The applicant requests the City amend the General Plan by changing the land use designation on approximately 0.47 acres from Low Density Residential (LDR) to Regional Commercial (RC) and amend Section 22-5-3(A) and the zoning map of the City of Orem by zoning approximately 1.83 acres of property located at 1045 North 1200 West from the PD-22 and R8 zones to the HS zone.

BACKGROUND:
The applicant proposes to construct a new office building with 21,500 square feet on property at 1045 North 1200 West. The property on which the development is proposed consists of two separate parcels. The first parcel is located on 1200 West directly north of BJ's Plumbing at 1045 North and is currently zoned PD-22 (Northgate). The second parcel is located directly north of and adjacent to the first parcel. The second parcel is currently zoned R8 and has access from a residential cul-de-sac (1160 West).

There are a number of elements related to the current zoning that the applicant would like to change in order to develop the property as desired. The first issue concerns parking. The PD-22 zone requires five stalls per thousand square feet which is a higher standard than the City's other commercial zones which typically require four stalls per thousand square feet. The lower parking standard of the HS zone (which would require 22 fewer stalls for a building of this size) would enable the applicant to add an additional 5,000 square feet of space in a basement level which it would otherwise be unable to do.

Rezoning the property to HS would also grant the applicant greater flexibility with regard to architectural style and exterior finish materials. The PD-22 zone requires buildings to comply with a Tuscan architectural style and exterior finish materials. The HS zone would simply require that the building be finished with brick, fluted block, colored textured block, glass, synthetic stucco and/or wood.

The applicant also desires to rezone the second parcel from R8 to HS so that it can be used as parking area for the office building. The grade of this second parcel will be lowered substantially so that its use as parking would have a reduced impact on the adjoining residential lots. The access to this lot from the cul-de-sac will be eliminated and it is anticipated that the area of the access will be conveyed to the adjoining residential lots.

The applicant's proposed development will require considerable grading on the property due to the existing slope. Formal approval of the grading plan will be required prior to site plan approval.

A neighborhood meeting regarding the proposed rezone was held on December 10, 2015, at the City Center with three people in attendance. At the meeting the proposed site plan was shown and the need for the residential lot for parking was discussed. The two neighbors adjacent to the residential parcel were concerned with the existing access from the cul-de-sac that they use to access their backyards and whether the project would be accessed from the cul-de-sac. They were informed that the project will not be accessible from the cul-de-sac and the stem of the flag lot will be deeded to the adjacent property owners to maintain their backyard access.

No issues from residents were expressed during the Planning Commission public hearing on February 17, 2016.

The traffic study for the project showed that rezoning the residential property to a commercial use would allow for a larger building and the increase in trip generation would be minimal (an extra 44 trips a day).

Advantages of the proposal:

- A rezone to the highway services zone would allow a larger office building at the proposed location due to a reduced parking standard. However, the parking standard proposed is a typical standard used throughout the City's commercial zones.
- The applicant's proposal to move its building closer to 1200 West will create a more pedestrian friendly environment and will improve the look of the 1200 West corridor.
- The building materials required in the Highway Services zone promote a high quality development.

Disadvantages of the proposal:

- If the subject property is rezoned to the HS zone, the development on the property will not need to conform to the architectural requirements of the PD-22 zone which may or may not be seen as a disadvantage depending on one's architectural preferences.

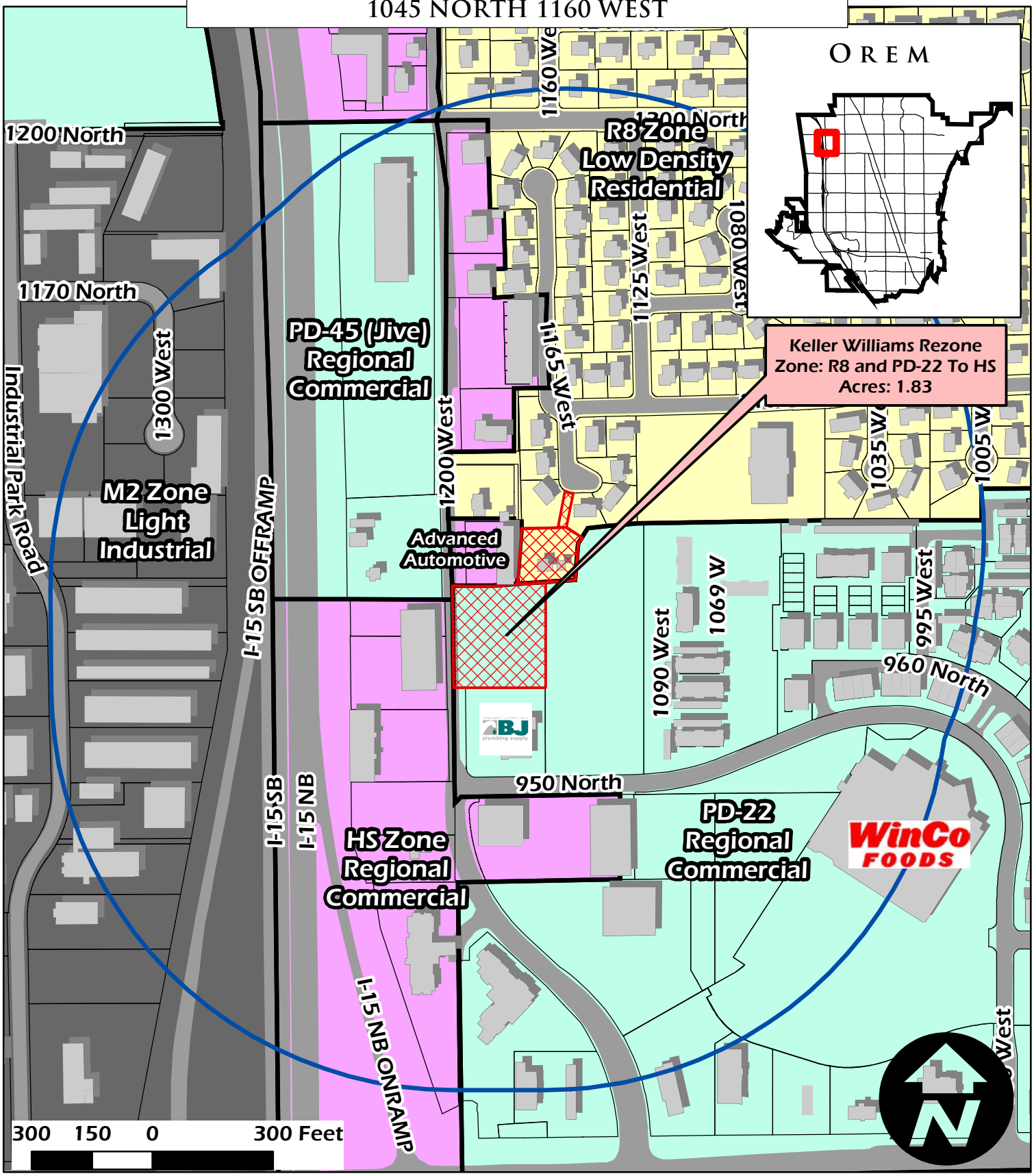
RECOMMENDATION:

The Planning Commission recommends the City Council amend the General Plan by changing the Land Use designation on approximately 0.47 acres from Low Density Residential (LDR) to Regional Commercial (RC)

and amend Section 22-5-3(A) and the zoning map of the City of Orem by zoning approximately 1.83 acres of property located at 1045 North 1200 West from the PD-22 and R8 zones to the HS zone. City staff supports the Planning Commission recommendation.

Keller Williams Rezone

1045 North 1160 West



Keller Williams Rezone:
R8 and PD-22 to HS; 1.83 Acres.

NIA CONTACT:
Timpview
Neighborhood

Legend
- Buffer_of_KW_Rezone
- Buildings
- KW Rezone
- Parcels

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ORDINANCE NO. _____

AN ORDINANCE BY THE OREM CITY COUNCIL AMENDING THE GENERAL PLAN BY CHANGING THE LAND USE DESIGNATION ON APPROXIMATELY 0.47 ACRES FROM LOW DENSITY RESIDENTIAL (LDR) TO REGIONAL COMMERCIAL (RC) AND AMENDING SECTION 22-5-3(A) AND THE ZONING MAP OF THE CITY OF OREM BY ZONING APPROXIMATELY 1.83 ACRES OF PROPERTY LOCATED AT 1045 NORTH 1200 WEST FROM THE PD-22 AND R8 ZONES TO THE HIGHWAY SERVICES (HS) ZONE

WHEREAS on December 12, 2015, Boyd Brown filed an application with the City of Orem requesting the City amend the General Plan by changing the Land Use designation on approximately 0.47 acres from Low Density Residential (LDR) to Regional Commercial (RC) and amend Section 22-5-3(A) and the zoning map of the City of Orem by zoning approximately 1.83 acres of property located at 1045 North 1200 West from the PD-22 and R8 zones to the Highway Services (HS) zone; and

WHEREAS amending the General Plan from LDR to RC on 0.47 acres and rezoning the entire subject property from PD-22 and R8 to HS will allow for an office building to be built on the subject property; and

WHEREAS the proposed amendment would allow for the development of a larger office building at the proposed location because of the reduced parking requirements of the HS zone; and

WHEREAS a public hearing considering the subject application was held by the Planning Commission on February 17, 2016 and the Planning Commission recommended approval of the application; and

WHEREAS the City Council held a public hearing regarding the proposed rezone on March 8, 2016; and

WHEREAS five hundred and fourteen (514) notices of the public hearing to be held before the City Council on the subject application were mailed to all residents and property owners within 1,000 feet of the subject property and all properties in the PD-22 zone on February 9, 2016; and

WHEREAS the agenda of the City Council meeting at which the public hearing on the subject application was held was posted at the Orem Public Library, on the Orem City webpage and at the City Offices at 56 North State Street; and

WHEREAS the matter having been submitted and the City Council having fully considered the request as it relates to the health, safety and general welfare of the City; the orderly development of land in the City; and the special conditions applicable to the request.

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NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF OREM, UTAH, as follows:

1. The City Council finds that this request is in the best interest of the City because it will promote the development of a high quality commercial development adjacent to 1200 West that will be conveniently located to I-15 and will enhance the quality and appearance of 1200 West.

2. The City Council hereby amends the General Plan by changing the Land Use designation on approximately 0.47 acres from Low Density Residential (LDR) to Regional Commercial (RC) and amends Section 22-5-3(A) and the zoning map of the City of Orem by zoning approximately 1.83 acres of property located at 1045 North 1200 West from the PD-22 and R8 zones to the Highway Services (HS) zone as shown in Exhibit "A" which is attached hereto and incorporated herein by reference.

3. If any part of this ordinance shall be declared invalid, such decision shall not affect the validity of the remainder of this ordinance.

4. All ordinances, resolutions or policies in conflict herewith are hereby repealed.

5. This ordinance shall take effect immediately upon passage and publication in a newspaper of general circulation in the City of Orem.

PASSED, APPROVED and ORDERED PUBLISHED this **8th** day of **March** 2016.

_____
Richard F. Brunst, Jr., Mayor

ATTEST:

_____
Donna R. Weaver, City Recorder

COUNCIL MEMBERS VOTING "AYE"

_____

_____

COUNCIL MEMBERS VOTING "NAY"

_____

_____

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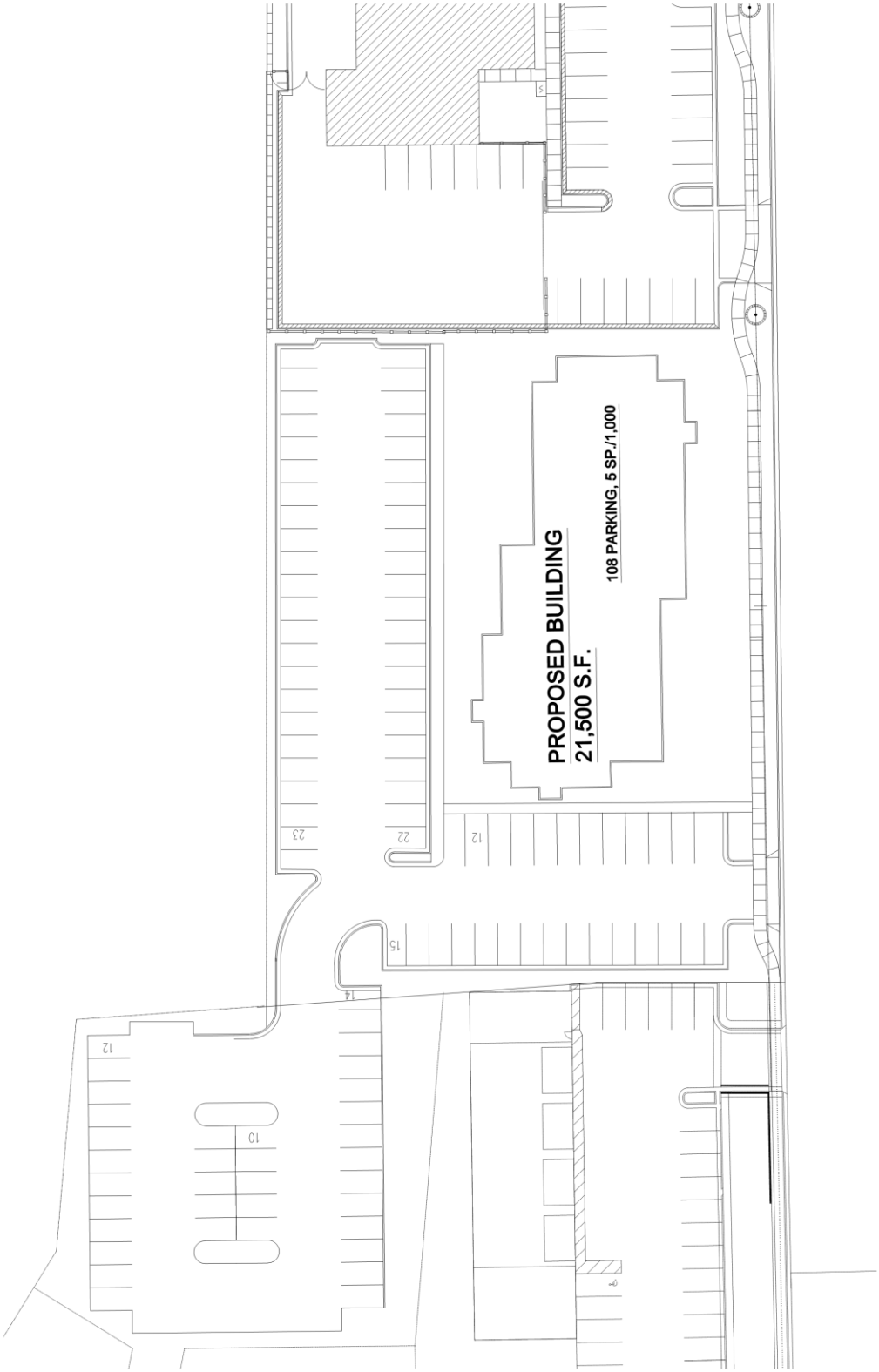
EXHIBIT A



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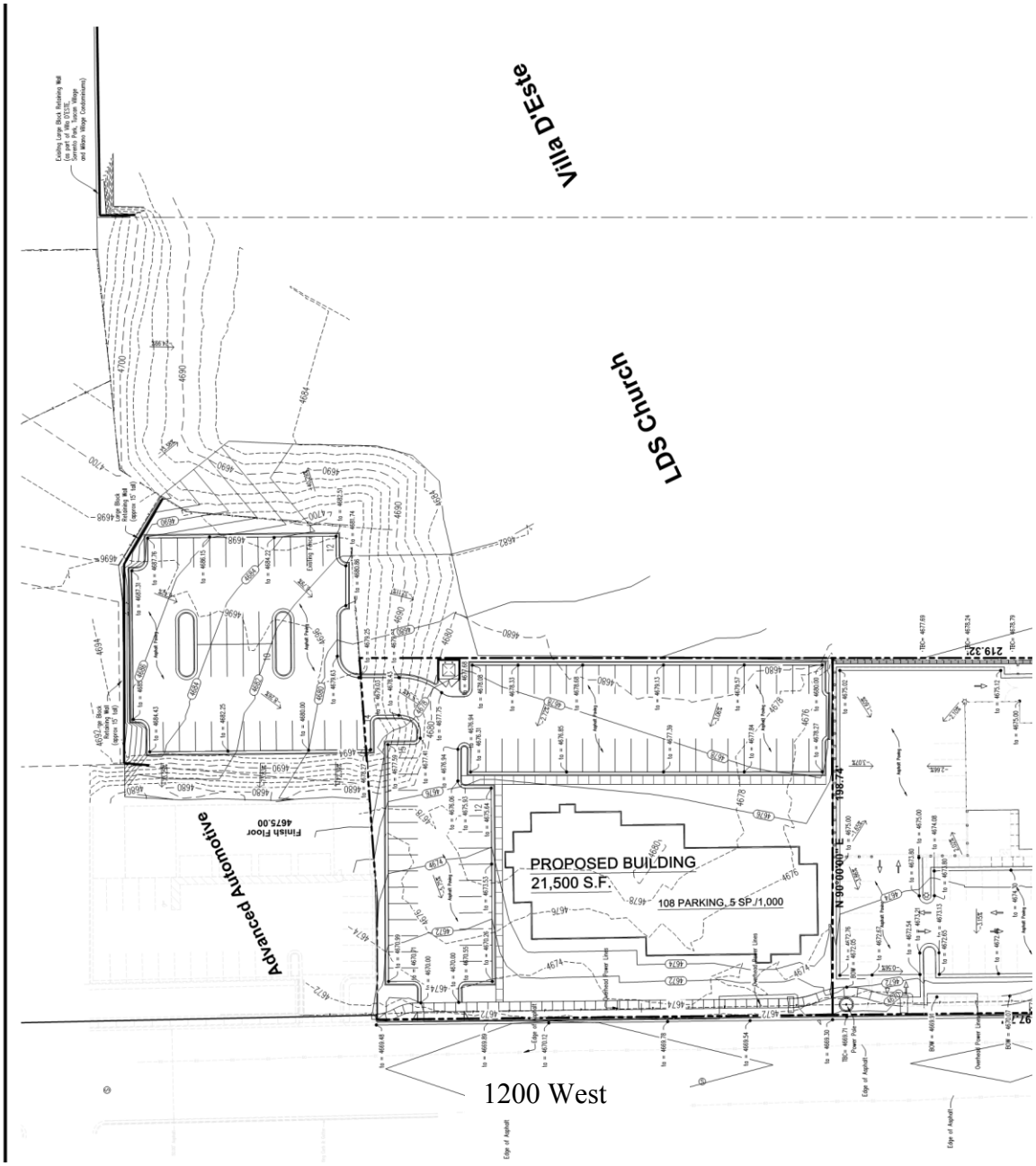
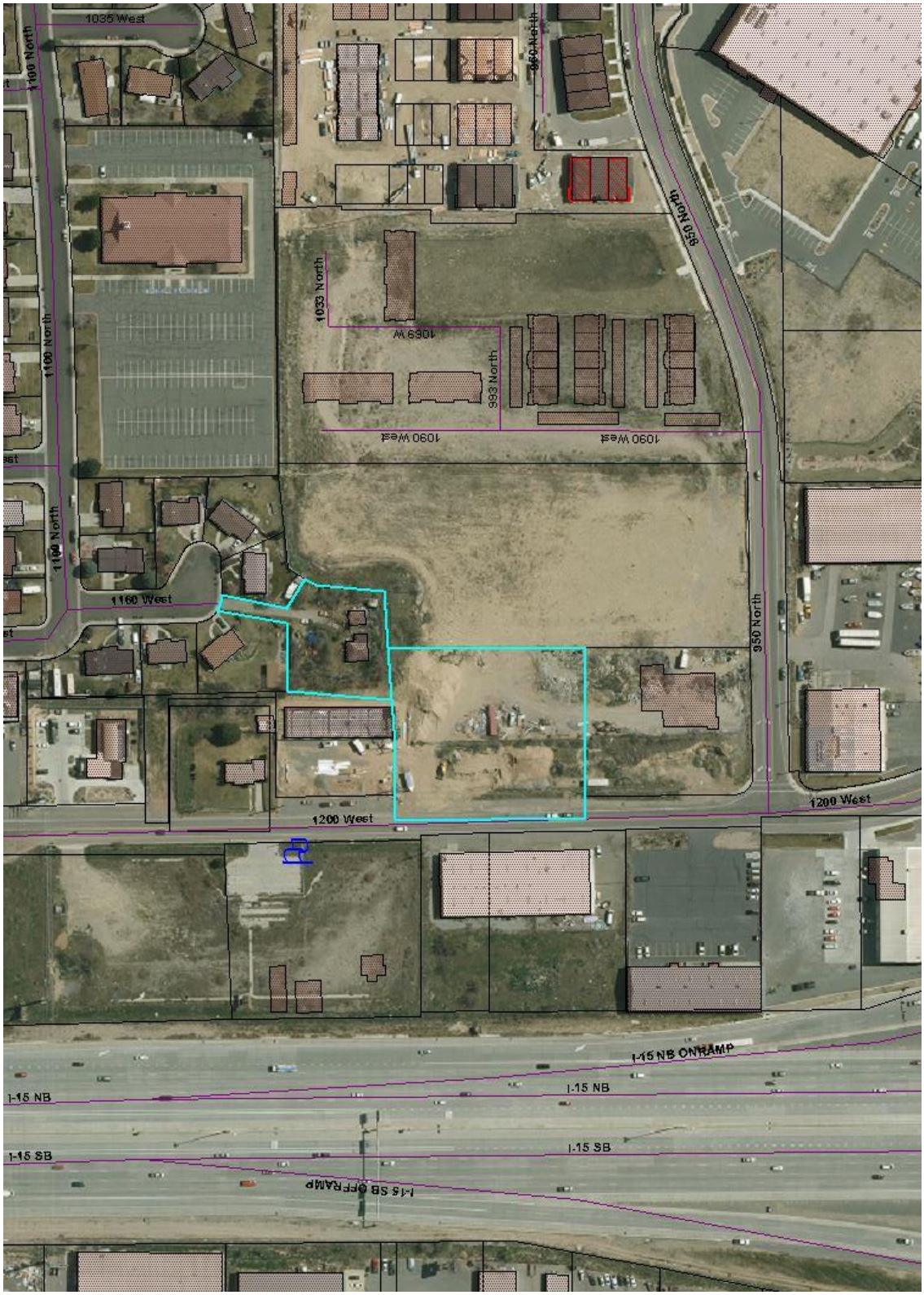
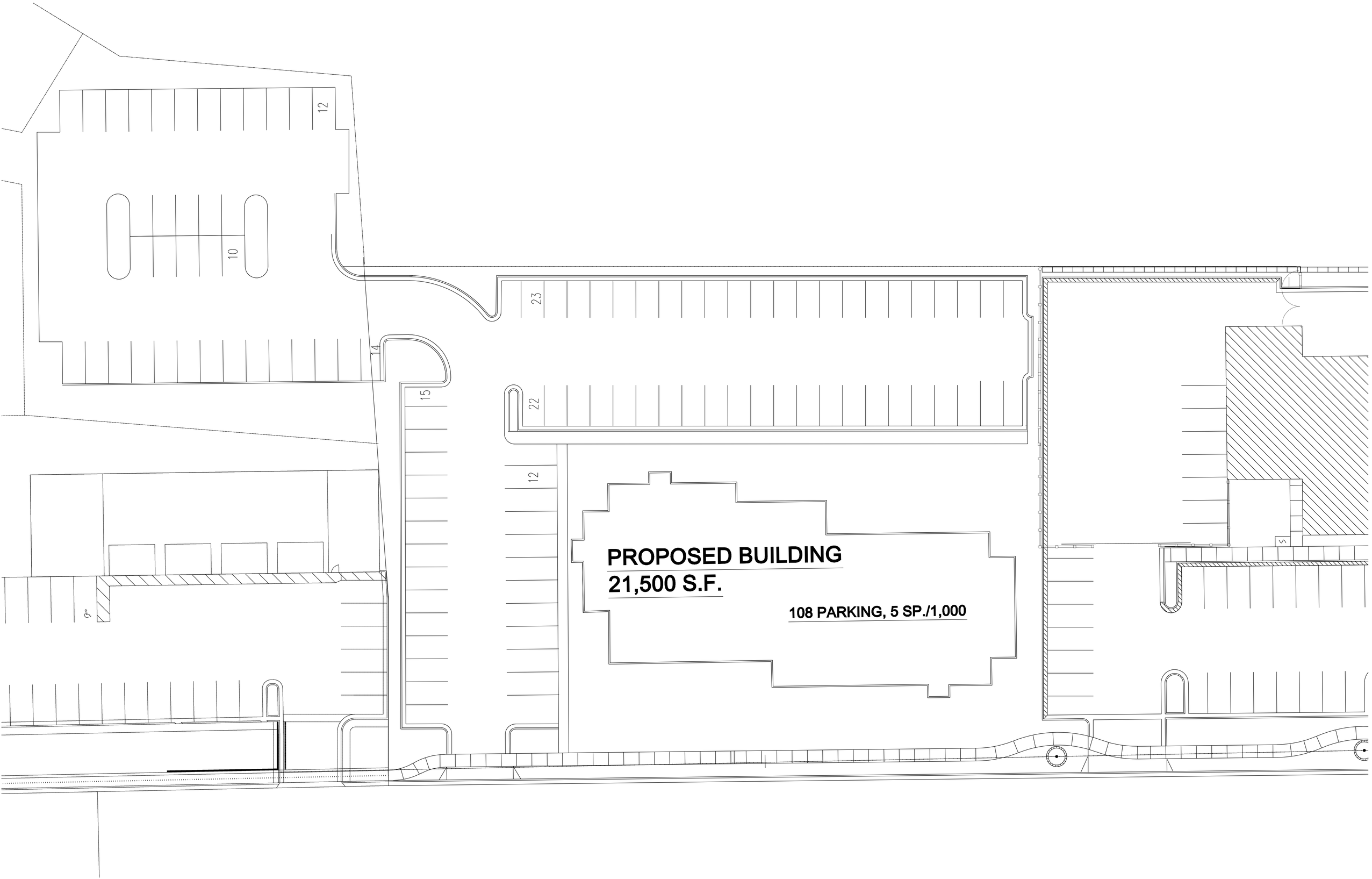
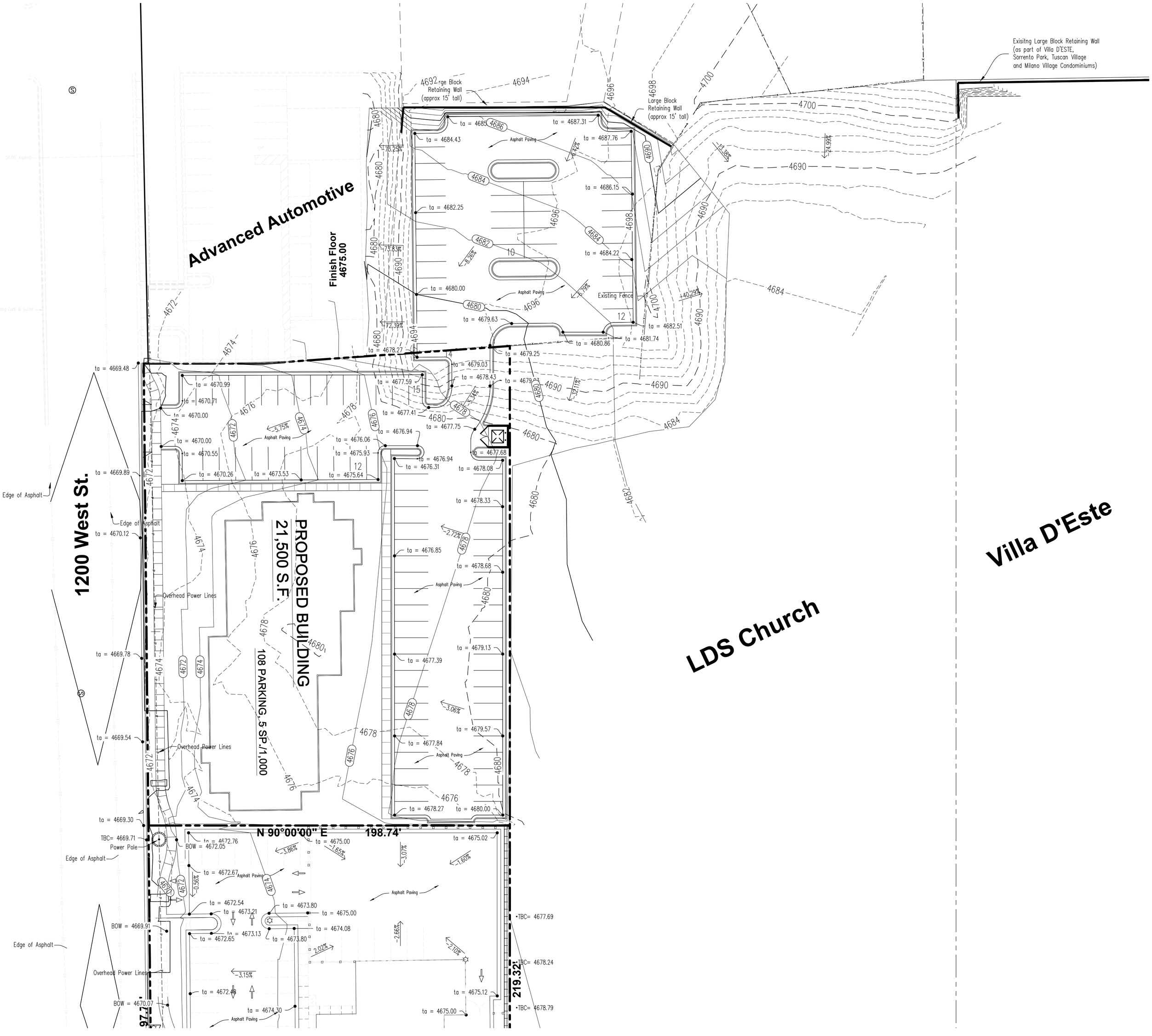

Villa D'Este
LDS Church
Advanced Automotive
Finish Floor
4675.00
PROPOSED BUILDING
21,500 S.F.
108 PARKING, 5 SP./1,000
N 89°00'00" E
198.74'
219.33'
1200 West


1035 West
1100 North
1100 North
1100 North
1160 West
1200 West
1200 West
1090 West
1090 West
1069 W
1033 North
993 North
950 North
950 North
950 North
I-15 NB
I-15 NB
I-15 NB ONRAMP
I-15 SB
I-15 SB
I-15 SB OFFRAMP


12
10
14
23
15
22
12
PROPOSED BUILDING
21,500 S.F.
108 PARKING, 5 SP./1,000

PROPOSED OFFICE BUILDING, OREM, UTAH
scholz
ARCHITECTS


Advanced Automotive
Finish Floor
4675.00
1200 West St.
PROPOSED BUILDING
21,500 S.F.
108 PARKING, 5 SP./1,000
LDS Church
Villa D'Este
Exisitng Large Block Retaining Wall
(as part of Villa D'ESTE,
Sorrento Park, Tuscan Village
and Milano Village Condominiums)
Large Block
Retaining Wall
(approx 15' tall)
Asphalt Paving
Existing Fence
Edge of Asphalt
Overhead Power Lines
Power Pole
N 90°00'00" E 198.74'
219.32'
97.7'

MEMORANDUM

Date: February 9, 2016

To: Paul Goodrich, PE
Orem City Engineering

From: Hales Engineering

Subject: Orem – Boyd Brown Office Trip Generation Study

UT16-845

PURPOSE

The purpose of this memo is to complete a trip generation comparison for the proposed Boyd Brown Office project in Orem. The proposed office building will have 21,500 square feet of office space (10,750 sq. ft. on 2 floors). This is made possible by the additional ½ acre residential lot that was acquired behind the proposed office (see the Appendix for a site plan). This will be used for additional parking, however, the residential lot will require a zone change. The additional parking area allows the square footage of the proposed office to be increased from 17,500 to 21,500 sq. ft. The trip generation comparison will be completed for the proposed office building (21,500 sq. ft.) and what would be allowed to be built under the existing zoning (17,500 sq. ft.).

TRIP GENERATION

Daily trip generation for the office will be generated using the Institute of Transportation Engineers, *Trip Generation*, 9th Edition, 2012, (Land Use 710 – General Office Building) for both the existing zoning (17,500 sq. ft.) and with the proposed zone change (21,500 sq. ft.).

The ITE Trip Generation rate for daily trips by an office is 11.08 trips per 1,000 square feet of gross floor area (GFA). Under the existing zoning, 17,500 sq. ft. of office space would be allowed, which will generate approximately 194 daily trips (17.5 X 11.08). It is anticipated that with the proposed zone change the additional square footage will increase by 4,000 square feet to 21,500 square feet (total) which will generate approximately 238 daily trips (21.5 X 11.08). The proposed zone change will allow the office space to be 4,000 square feet larger and will generate an additional 44 daily trips (238 – 194), see Table 1.

Table 1
Orem - Boyd Brown Office TGS
Trip Generation

Weekday Daily	Land Use[1]	Number of Units	Unit Type	Trip Generation	% Entering	% Exiting	Trips Entering	Trips Exiting	Total Daily Trips
Existing Zoning	General Office Building (710)	17.5	1,000 Sq. Ft. GFA	194	50%	50%	97	97	**194**
Proposed Zoning	General Office Building (710)	21.5	1,000 Sq. Ft. GFA	238	50%	50%	119	119	**238**
A.M. Peak Hour	Land Use[1]	Number of Units	Unit Type	Trip Generation	% Entering	% Exiting	Trips Entering	Trips Exiting	Total a.m. Trips
Existing Zoning	General Office Building (710)	17.5	1,000 Sq. Ft. GFA	28	88%	12%	25	3	**28**
Proposed Zoning	General Office Building (710)	21.5	1,000 Sq. Ft. GFA	34	88%	12%	30	4	**34**
P.M. Peak Hour	Land Use[1]	Number of Units	Unit Type	Trip Generation	% Entering	% Exiting	Trips Entering	Trips Exiting	Total p.m. Trips
Existing Zoning	General Office Building (710)	17.5	1,000 Sq. Ft. GFA	28	17%	83%	5	23	**28**
Proposed Zoning	General Office Building (710)	21.5	1,000 Sq. Ft. GFA	34	17%	83%	6	28	**34**

1. Land Use Code from the Institute of Transportation Engineers Trip Generation Manual (9th Edition - 2012)

SOURCE: Hales Engineering, 2016

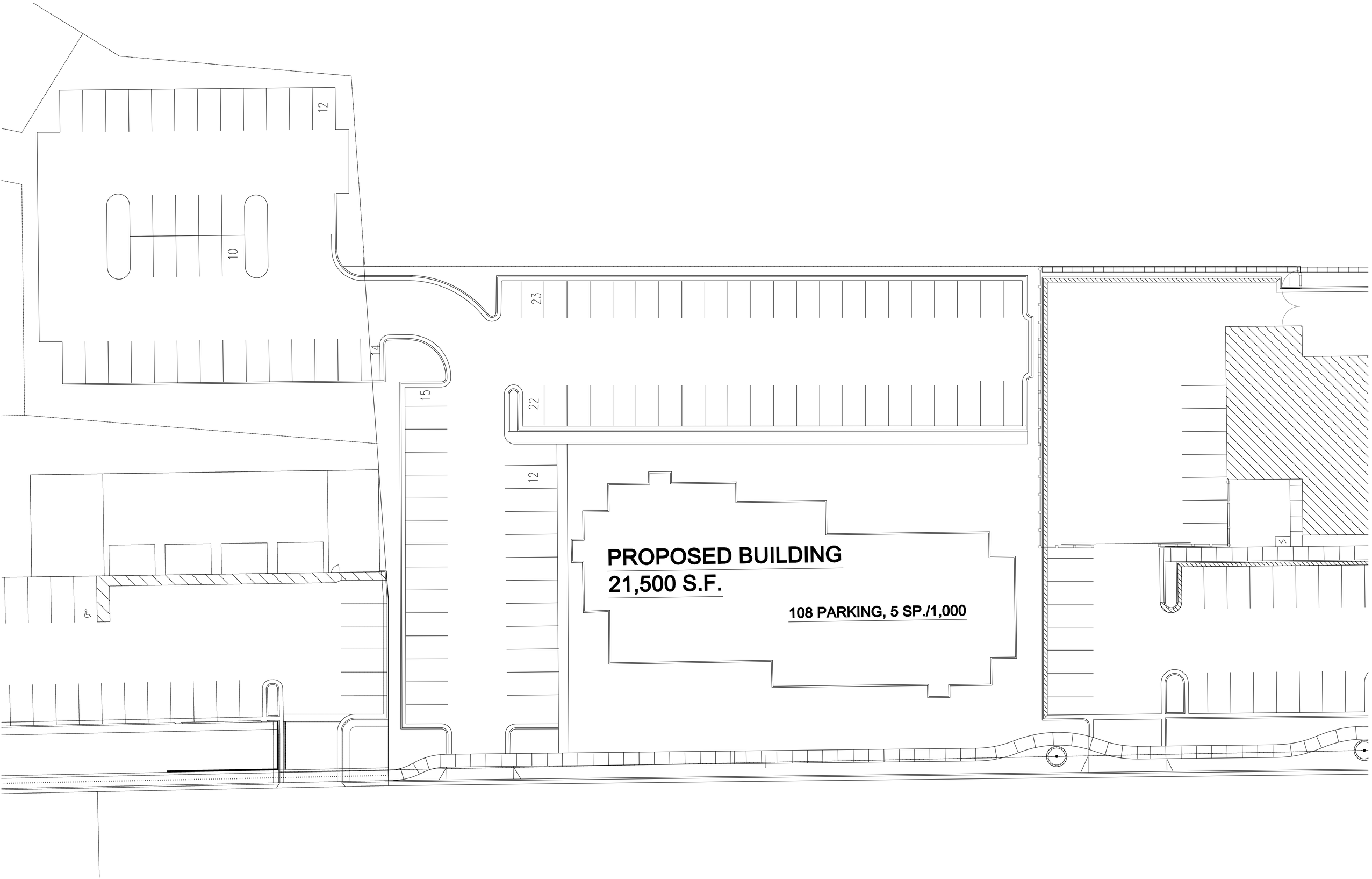
FINDINGS AND RECOMMENDATIONS

The findings and recommendations of the study are as follows:

- The existing zoning would allow 17,500 square feet of office space and would generate approximately 194 daily trips to the site
- The proposed zone change would allow an additional 4,000 square feet of office space for 21,500 square feet total and would generate approximately 238 daily trips to the site
- The proposed zoning change would result in 44 additional trips to the site (based on ITE calculations)

Please call us know if you have any questions, or if you need additional information.

APPENDIX


12
10
14
23
15
22
12
PROPOSED BUILDING
21,500 S.F.
108 PARKING, 5 SP./1,000

W 1050 N
253.50'
1.15 acres
190.73'
N 1200 W
N 1200 W S
W 950 N
Veterans' Memorial Hwy
15
© 2015 Google
Google earth

MEMORANDUM

Date: February 16, 2016

To: Paul Goodrich, PE
Orem City Engineering

From: Hales Engineering

Subject: Orem – Boyd Brown Office Trip Generation Study

UT16-845

PURPOSE

The purpose of this memo is to complete a trip generation comparison for the proposed Boyd Brown Office project in Orem. The proposed office building will have 26,800 square feet of office space (2 floors and a half basement). This is made possible by the additional ½ acre residential lot that was acquired behind the proposed office (see the Appendix for a site plan). This will be used for additional parking, however, the residential lot will require a zone change. The additional parking area allows the square footage of the proposed office to be increased from 21,000 to 26,800 sq. ft. The trip generation comparison will be completed for the proposed office building (26,800 sq. ft.) and what would be allowed to be built under the existing zoning (21,000 sq. ft.).

TRIP GENERATION

Daily trip generation for the office will be generated using the Institute of Transportation Engineers, *Trip Generation*, 9th Edition, 2012, (Land Use 710 – General Office Building) for both the existing zoning (21,000 sq. ft.) and with the proposed zone change (26,800 sq. ft.).

The ITE Trip Generation rate for daily trips by an office is 11.03 trips per 1,000 square feet of gross floor area (GFA). Under the existing zoning, 21,000 sq. ft. of office space would be allowed, which will generate approximately 232 daily trips (21 X 11.03). It is anticipated that with the proposed zone change the additional square footage will increase by 5,800 square feet to 26,800 square feet (total) which will generate approximately 296 daily trips (26.8 X 11.03). The proposed zone change will allow the office space to be 5,800 square feet larger and will generate an additional 64 daily trips (296 – 232), see Table 1.

Table 1
Orem - Boyd Brown Office TGS
Trip Generation

Weekday Daily	Land Use[1]	Number of Units	Unit Type	Trip Generation	% Entering	% Exiting	Trips Entering	Trips Exiting	Total Daily Trips
Existing Zoning	General Office Building (710)	21	1,000 Sq. Ft. GFA	232	50%	50%	116	116	**232**
Proposed Zoning	General Office Building (710)	26.8	1,000 Sq. Ft. GFA	296	50%	50%	148	148	**296**
A.M. Peak Hour	Land Use[1]	Number of Units	Unit Type	Trip Generation	% Entering	% Exiting	Trips Entering	Trips Exiting	Total a.m. Trips
Existing Zoning	General Office Building (710)	21	1,000 Sq. Ft. GFA	34	88%	12%	30	4	**34**
Proposed Zoning	General Office Building (710)	26.8	1,000 Sq. Ft. GFA	42	88%	12%	37	5	**42**
P.M. Peak Hour	Land Use[1]	Number of Units	Unit Type	Trip Generation	% Entering	% Exiting	Trips Entering	Trips Exiting	Total p.m. Trips
Existing Zoning	General Office Building (710)	21	1,000 Sq. Ft. GFA	32	17%	83%	5	27	**32**
Proposed Zoning	General Office Building (710)	26.8	1,000 Sq. Ft. GFA	40	17%	83%	7	33	**40**

1. Land Use Code from the Institute of Transportation Engineers Trip Generation Manual (9th Edition - 2012)

SOURCE: Hales Engineering, 2016

FINDINGS AND RECOMMENDATIONS

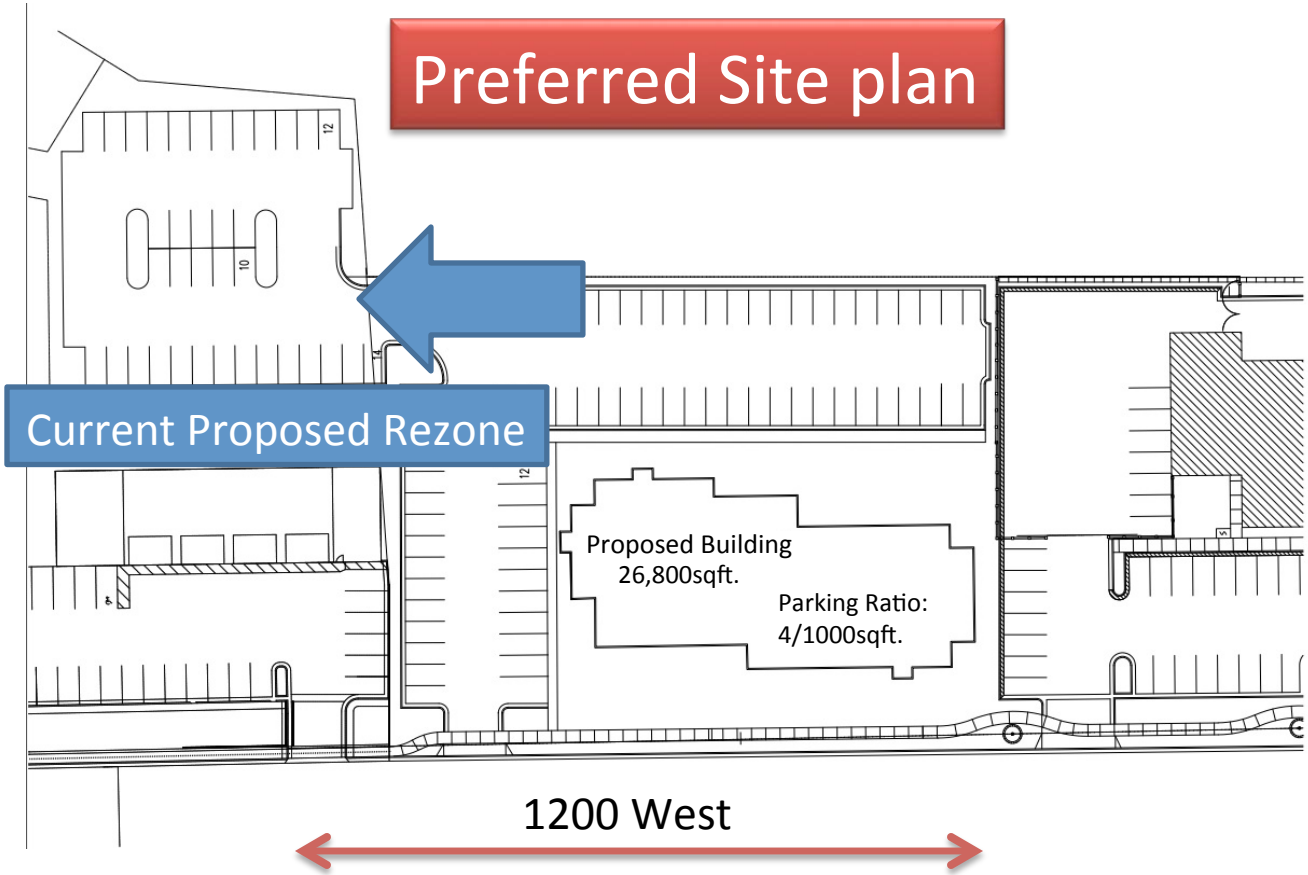
The findings and recommendations of the study are as follows:

- The existing zoning would allow 21,000 square feet of office space and would generate approximately 232 daily trips to the site
- The proposed zone change would allow an additional 5,800 square feet of office space for 26,800 square feet total and would generate approximately 296 daily trips to the site
- The proposed zoning change would result in 64 additional daily trips to the site (based on ITE calculations)

Please call us know if you have any questions, or if you need additional information.

APPENDIX

KELLERWILLIAMS. REAL ESTATE



AGENDA ITEM 4.1 is a request by Boyd Brown to **AMEND THE GENERAL PLAN BY CHANGING THE LAND USE DESIGNATION ON APPROXIMATELY 0.47 ACRES FROM LOW DENSITY RESIDENTIAL (LDR) TO REGIONAL COMMERCIAL (RC) AND AMEND SECTION 22-5-3(A) AND THE ZONING MAP OF THE CITY OF OREM BY ZONING APPROXIMATELY 1.83 ACRES OF PROPERTY LOCATED AT 1045 NORTH 1200 WEST FROM THE PD-22 AND R8 ZONES TO THE HIGHWAY SERVICES (HS) ZONE.**

Staff Presentation: Mr. Spencer said the applicant proposes to construct a new office building with 21,500 square feet. As shown on the proposed site plan, there are two (2) existing properties involved in the request.

The first is located on 1200 West directly north of BJ's Plumbing at 1045 North and is currently zoned PD-22, which zoning includes the Northgate Development area. By removing the property from the PD-22 zone and zoning the property HS the following conditions will exist:

- The finishing materials for the existing building do not have to match the Tuscan color scheme and architectural requirements of the PD-22 zone.
- The finishing materials acceptable in the HS zone include: brick, fluted block, colored textured block, glass, synthetic stucco and wood.
- No retail component is required with the proposed building (although this requirement would not affect the amount of retail in the proposed building)
- The parking requirement changes from one (1) stall per 200 square feet in the PD-22 zone to one (1) stall per 250 square feet in the HS zone. For 21,500 square feet the HS zone requires twenty-two (22) less stalls than the PD-22 zone.

Second, a portion of the proposed site plan is currently zoned R8 and has a Land Use designation of Low Density Residential (LDR). As part of the application, the applicant requests that the vacant residential lot, excluding the drive access from the cul-de-sac, be changed so the General Plan is Regional Commercial and both the lot on 1200 West and the residential lot be rezoned to the HS zone. A new subdivision will be required at site plan approval showing the stem portion of the residential property being deeded to the adjacent property owners. This part of the existing residential property will not be included in the rezone or general plan amendments and will become part of the residential subdivision. No access from the residential neighborhood to the proposed office building is allowed.

There will be considerable grading on the property because of the existing slope and the proposed grading plan indicates that the church property located to the east, and the Advanced Automotive property will be impacted. Written consent from both these users is required in order to execute the proposed grading plan. The additional grading will provide the necessary parking for the project. According to the Orem City Engineering department, grading on the site is allowed because the existing slope is man-made, and the proposed retaining wall will be required to have a geotechnical and geological report detailing the design of the wall. Section 17-8-2 states that hillsides in their natural state are subject to the Hillside Development ordinance. Formal approval of the grading plan will be required prior to site plan approval.

A neighborhood meeting was held on December 10, 2015, at the City Center with three (3) people in attendance. At the meeting the proposed site plan was shown and the need for the residential lot for parking discussed. The two (2) adjacent neighbors were concerned with the existing residential access they use to access their backyards, and whether or not the project would be accessed through the residential neighborhood. The project will not be accessed through the subdivision, and the stem of the flag lot will be deeded to the adjacent property owners to maintain their backyard access.

The initial request from the applicant was to zone the proposed property to the PD-22 zone. The applicant later requested to zone the property to HS. Another neighborhood meeting was held on February 11, 2015 to discuss the General Plan change as well as the updated zoning information.

The traffic study for the project showed that by rezoning the residential property to a commercial use, it allows for a larger building and the increase on trip generation is minimal (extra 44 trips a day).

Advantages

- The amendment increases the options for locating a large office building at the proposed location because of parking and retail requirements of the HS zone.
- The applicant is proposing to move their building closer to the road to provide a more pedestrian friendly environment and to improve the look of the 1200 West corridor.
- The proposed office building promotes a high quality of commercial development and takes advantage of the proximity to I-15 as outlined in the HS zone.

Disadvantages

- There are fewer architectural requirements in the HS zone than the PD-22 zone, although the HS zone does include architectural standards for finishing materials.

Recommendation: Based on the advantages of the proposed amendments staff recommends the Planning Commission forward a positive recommendation to the City Council to amend the General Plan by changing the Land Use designation on approximately 0.47 acres from Low Density Residential (LDR) to Regional Commercial (RC) and amend Section 22-5-3(A) and the Zoning Map of the City of Orem by zoning approximately 1.83 acres of property located at 1045 North 1200 West from the PD-22 and R8 zones to the HS zone.

Chair Larsen asked if the Planning Commission had any questions for Mr. Spencer.

Mr. Moulton asked if there will be any runoff issues. Mr. Stroud said that is a site plan issue. There are stringent storm water requirements that will have to be met at site plan.

Mr. Cook asked if the reduction of parking is that because there is not a retail component. Mr. Spencer said the HS zone allows for fewer parking standards. One parking stall per 250 square feet is the required minimum throughout the City. The PD-22 zone did have a higher parking standard. Staff feels this parking standard does fit the intended use.

Chair Larsen noted the BJ Plumbing and Advance Automotive set further off of 1200 West. This will be closer to 1200 West. She wondered if down the road when 1200 West is widened that this will be too close. Mr. Goodrich said the widening of 1200 West will be widened on the west side of the street. There is a power line corridor on the east side of the road and there is an "S" curve at 1200 North.

Chair Larsen opened the public hearing and invited those from the audience who had come to speak to this item to come forward to the microphone.

When no one came forward, Chair Larsen closed the public hearing and asked if the Planning Commission had any more questions for the applicant or staff. When none did, she called for a motion on this item.

Planning Commission Action: Chair Larsen said she is satisfied that the Planning Commission has found this request complies with all applicable City codes. She then moved to recommend the City Council amend the General Plan by changing the Land Use designation on approximately 0.47 acres from Low Density Residential (LDR) to Regional Commerical (RC) and amend Section 22-5-3(A) and the zoning map of the City of Orem by zoning approximately 1.83 acres of property located at 1045 North 1200 West from the PD-22 and R8 zones to the Highway Services (HS) zone. Mr. Iglesias seconded the motion. Those voting aye: Carl Cook, Carlos Iglesias, Lynnette Larsen, and David Moulton. The motion passed unanimously.

Minutes for Neighborhood Meeting

Topics Discussed

- Proposed Rezone- Showed the neighbors our plans for the possible re zone. Explained it will be rezoned solely for additional parking to our office building.
- Site Plans for our building were discussed.
- Neighbors voiced concerns about strip of land that split's their property. We assured them our plan is not to create an access point, the plan is to continue the wall from the church along their property to block off that section, and we can either sell or gift the remaining land to them.
- Neighbors questions were answered and they left happy.

Keller Williams Rezone – 1045 North 1200 West

Notes from February 11, 2016 - neighborhood meeting held from 5 to 6.

In attendance:
Boyd Brown
Mary and Kelly Smith
Paul Washburn
Al Spencer
Mark Long

One other neighbor that looked at our stuff and asked if how soon, seemed happy then left without signing in.

Notes:
Al Spencer mentioned that he generally opposes all developers. We showed him our plan and he said he had no problem with it. Stayed and shared numerous thoughts on Orem City business.

Kelly and Mary Ann Smith live in the neighborhood to the southeast. They wanted to be sure we would not be accessing the project from the residential neighborhood. Said they like our plan and just don't want more traffic coming through their residential street.

Paul Washburn attended and is in support.

Mark Long came and we discussed deeding him the driveway portion of our lot if we gain approvals. He seemed to be supportive and had some techical questions about the retaining wall. We let him know that he could have access to our engineers and contractors as we proceed to ask questions.

We have not received any further calls or comments from the more than 500 notices that we sent.

For more information, contact
Clinton A. Spencer at
(801) 229-7267 or

City Council Chambers, 56 N State Street

City Council
Tue, Mar 8, 2016
6:10 pm

Planning Commission
Wed, Feb 17, 2016
5:00 pm

The applicant requests the City amend the General Plan by changing the Land Use designation on approximately 0.47 acres from Low Density Residential (LDR) to Community Commercial (CC) and amend Section 22-5-3(A) and the Zoning Map of the City of Orem by zoning approximately 1.83 acres of property located at 1045 North 1200 West from the PD-22 and R8 zones to the HS zone. Boyd Brown filed the application and proposes to build a new office building on the site.

BRIAN & LISA KELLY
TIMPVIEW NEIGHBORHOOD CHAIR
668 W 1325 NORTH
OREM, UT

For more information, contact
Clinton A. Spencer at
(801) 229-7267 or

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MC DONALD'S REAL ESTATE COMPANY
PO BOX 182571
COLUMBUS, OH 43218

For more information, contact
Clinton A. Spencer at
(801) 229-7267 or

City Council Chambers, 56 N State Street

City Council
Tue, Mar 8, 2016
6:10 pm

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YOUNG, VICKY JO-ANNA
10100 THRIFT RD
CLINTON, MD 20735

For more information, contact
Clinton A. Spencer at
(801) 229-7267 or

City Council Chambers, 56 N State Street

City Council
Tue, Mar 8, 2016
6:10 pm

Planning Commission
Wed, Feb 17, 2016
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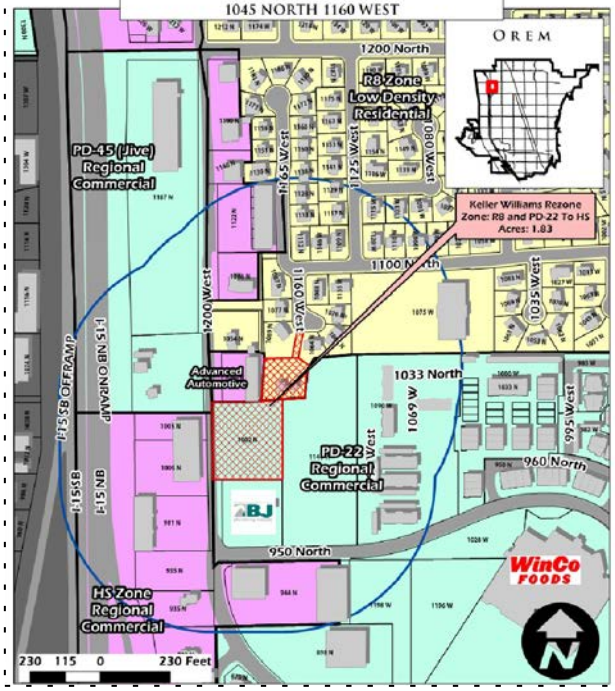
MAYO, DAVID (ET AL)
6630 CASTLE DR
BLOOMFIELD HILLS, MI 48301

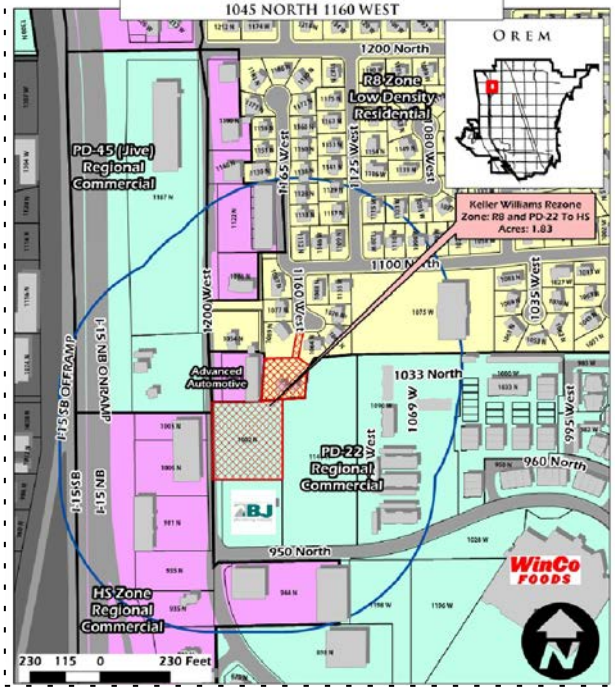
Keller Williams Rezone

1045 North 1160 West



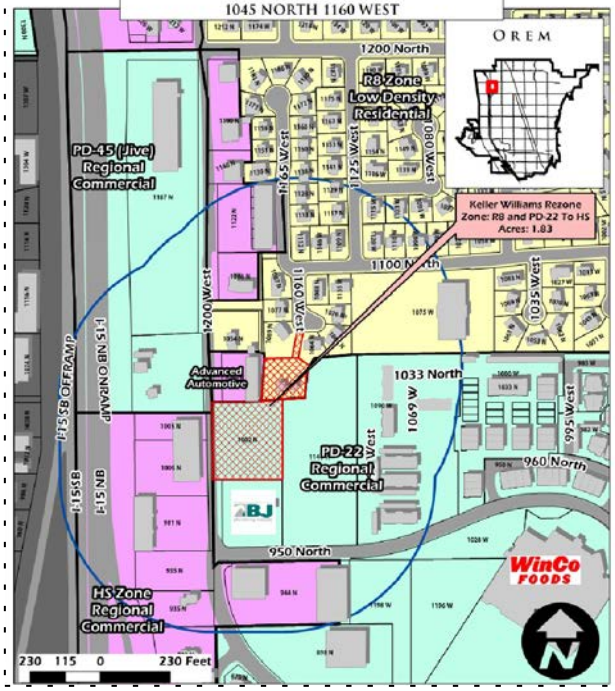
Keller Williams Rezone

1045 North 1160 West



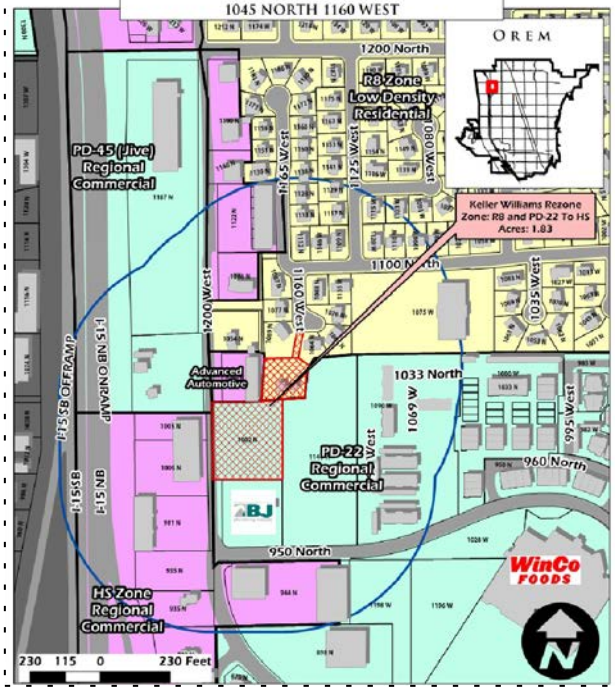
Keller Williams Rezone

1045 North 1160 West



Keller Williams Rezone

1045 North 1160 West



CITY OF OREM
NOTICE OF PLANNING COMMISSION
PUBLIC HEARING

The Planning Commission will hold the following public hearing on February 17, 2016 in the City of Orem Council Chambers, located at 56 North State Street, Orem, Utah, to consider the following:

February 17, 2016

5:00 p.m.

- General Plan and Zoning Ordinance Amendment – Amending the General Plan by changing the Land Use designation on approximately 0.47 acres from Low Density Residential (LDR) to Regional Commercial (RC) and amending Section 22-5-3(A) and the Zoning Map of the City of Orem by rezoning approximately 1.83 acres of property located at 1045 North 1200 West from the PD-22 and R8 zones to the HS zone. Boyd Brown filed the application.

The proposed amendment is available in the Office of Development Services, Room #105, 56 North State Street, Orem, Utah. If you have any questions regarding the proposed zone change or amendments, contact the Development Services Department at 229-7058.

THE PUBLIC IS INVITED TO PARTICIPATE IN ALL PLANNING COMMISSION MEETINGS.

If you need a special accommodation to participate in the Planning Commission Meetings, please call the City Recorder's Office.
(Voice 229-7074)

CITY OF OREM
NOTICE OF CITY COUNCIL
PUBLIC HEARING

The City Council will hold the following public hearing on March 8, 2016 in the City of Orem Council Chambers, located at 56 North State Street, Orem, Utah, to consider the following:

March 8, 2016

6:10 p.m.

- General Plan and Zoning Ordinance Amendment – Amending the General Plan by changing the Land Use designation on approximately 0.47 acres from Low Density Residential (LDR) to Regional Commercial (RC) and amending Section 22-5-3(A) and the Zoning Map of the City of Orem by rezoning approximately 1.83 acres of property located at 1045 North 1200 West from the PD-22 and R8 zones to the HS zone. Boyd Brown filed the application.

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(Voice 229-7074)

NORTHGATE VILLAGE
DEVELOPMENT LC
PO BOX 1234
OREM, UT 84059

FAIRBANKS, WILLIAM M (ET AL)
PO BOX 1239
OREM, UT 84059

NORTHGATE HOTEL LLC
%URRUTIA, SHARON
PO BOX 1327
EAGLE, ID 83616

UTAH DEPARTMENT OF
TRANSPORTATION
PO BOX 148420
SALT LAKE CITY, UT 84114

MC DONALD'S REAL ESTATE
COMPANY
PO BOX 182571
COLUMBUS, OH 43218

PROVO CITY COMM. DEV.
PO BOX 1849
PROVO, UT 84603

SILVER CREEK PRODUCE LLC
PO BOX 51998
IDAHO FALLS, ID 83405

ERCANBRACK, BENJAMIN &
BENJAMIN
PO BOX 536
OREM, UT 84059

HAAS, THOMAS J & LINDA A
PO BOX 542
PLEASANT GROVE, UT 84062

WINCO FOODS LLC
%TAX DEPARTMENT
PO BOX 5756
BOISE, ID 83705

DTS/AGRC MANAGER
STATE OFFICE BLDG, RM 5130
SALT LAKE CITY, UT 84114

MARK SEASTRAND
35 WEST 1670 SOUTH
OREM, UT 84058

ALAMO BUSINESS CENTER LLC
44 RED PINE DR
ALPINE, UT 84004

CORP OF THE PRES BISHOP CHURCH
OF JESUS CHRIST OF L D S
50 E N TEMPLE
SALT LAKE CITY, UT 84150

KRISTIE SNYDER
56 N STATE STREET
OREM, UT 84057

ROCKY MOUNTAIN POWER
70 NORTH 200 EAST
AMERICAN FORK, UT 84003

CENTURY LINK
75 EAST 100 NORTH
PROVO, UT 84606

FONSECA, WALSTIR H
76 S KINGS PEAK DR
LINDON, UT 84042

COMMON AREA
100 E CENTER
PROVO, UT 84606

COMMON AREA
100 E CENTER ST
PROVO, UT 84606

LINDON CITY
PLANNING DEPARTMENT
100 NORTH STATE STREET
LINDON, UT 84042

SOUND PROPERTIES LLC
151 S 240 E
OREM, UT 84058

K C WEST DEVELOPMENT LC (ET AL)
168 N 1200 E
OREM, UT 84097

SMITH, ERIC C & BONNIE L
184 E 1460 N
OREM, UT 84057

HOUSING AUTHORITY UTAH
COUNTY
LYNELL SMITH
240 EAST CENTER
PROVO, UT 84606

TOWN OF VINEYARD
240 E. GAMMON ROAD
VINEYARD, UT 84058

CPH HOLDINGS LLC
244 N 900 E
SALEM, UT 84653

SOELBERG PROPERTIES INC
248 MOUNTAIN WAY DR
OREM, UT 84058

OREM CITY
351 W CENTER
PROVO, UT 84601

HALLS, KARIN
442 W 1100 N
OREM, UT 84057

SUELDO, JORGE
446 W 165 S
OREM, UT 84058

MURDOCK, PHYLLIS S
482 E 1834 S
OREM, UT 84058

OLSEN, JACK D & GAE H
538 N 80 W
LINDON, UT 84042

MAG
586 EAST 800 NORTH
OREM, UT 84097

THEOBALD NORTHEAST LLC
665 W 925 S
OREM, UT 84058

BRENT SUMNER
744 WEST 550 SOUTH
OREM, UT 84058

NORTHGATE HOTEL LLC
--OR CURRENT RESIDENT--
873 N 1200 WEST
OREM, UT 84057

TIMP VALLEY LLC
--OR CURRENT RESIDENT--
890 N INDUSTRIAL PARK RD
OREM, UT 84057

DAVID SPENCER
899 NORTH 550 EAST
OREM, UT 84097

STUBALZABUL LLC
935 N 1200 W
OREM, UT 84057

WILLIAMSON, JERRY D & JOAN H (ET AL)
455 E 1600 S
OREM, UT 84097

THOMAS MACDONALD
489 NORTH PALISADES DR
OREM, UT 84097

POULSEN, DANIEL
566 S 1600 W
PROVO, UT 84601

WINN, DEBORAH S
611 W 1510 N
OREM, UT 84057

BRIAN & LISA KELLY
TIMPVIEW NEIGHBORHOOD CHAIR
668 W 1325 NORTH
OREM, UT

MAVERIK INC
--OR CURRENT RESIDENT--
833 N 1200 WEST
OREM, UT 84057

MAVERIK INC
%MURRAY, DAN
880 W CENTER ST
NORTH SALT LAKE, UT 84054

WINCO FOODS LLC
--OR CURRENT RESIDENT--
895 N 980 WEST
OREM, UT 84057

MAYOR RICHARD F. BRUNST, JR.
900 E HIGH COUNTRY DRIVE
OREM, UT 84097-2389

PREECE WORLD LLC
936 E 430 N
PLEASANT GROVE, UT 84062

JEEMA V LLC
470 S 200 W
SALEM, UT 84653

NORTHGATE VILLAGE DEVELOPMENT LC
507 N 1500 W
OREM, UT 84057

ALPINE SCHOOL DISTRICT
ATTN: SUPERINTENDENT
575 NORTH 100 EAST
AMERICAN FORK, UT 84003

PLANNED PARENTHOOD ASSOCIATION OF UTAH
654 S 900 E
SALT LAKE CITY, UT 84102

CLYDE HOPEFULL LLC
730 N 1500 W
OREM, UT 84057

STEINAGEL, JACK LEE & SHIRLEY IRENE
833 W 1000 N
OREM, UT 84057

SAM LENTZ
882 W 1720 N
OREM, UT 84057

MYHRE HOLDINGS-OREM LLC
--OR CURRENT RESIDENT--
898 N 1200 WEST
OREM, UT 84057

JACOB LAND DEVELOPMENT LLC
923 N 290 E
AMERICAN FORK, UT 84003

HERINGER SALES AND SERVICE INC
--OR CURRENT RESIDENT--
944 N 1200 WEST
OREM, UT 84057

THEOBALD NORTHEAST LLC
--OR CURRENT RESIDENT--
946 N INDUSTRIAL PARK RD
OREM, UT 84057

BILBY PROPERTIES LLC
--OR CURRENT RESIDENT--
950 N INDUSTRIAL PARK RD
OREM, UT 84057

K C WEST DEVELOPMENT LC (ET AL)
--OR CURRENT RESIDENT--
953 N 1030 WEST
OREM, UT 84057

SWH LTD
980 W 960 N
OREM, UT 84057

MURDOCK, PHYLLIS S
--OR CURRENT RESIDENT--
981 N 1200 WEST
OREM, UT 84057

DAN'S TOWING INC (ET AL)
984 W 1340 N
OREM, UT 84057

SPROAT, ETHAN M & LIBERTY P
--OR CURRENT RESIDENT--
986 W 950 NORTH
OREM, UT 84057

SPROAT, ETHAN M & LIBERTY P
986 W 960 N
OREM, UT 84097

988 PROPERTIES LLC
--OR CURRENT RESIDENT--
988 W 950 NORTH
OREM, UT 84057

BLEAK, NATHAN & STEPHANIE
--OR CURRENT RESIDENT--
990 W 950 NORTH
OREM, UT 84057

WILLIAMSON, JERRY D & JOAN H (ET AL)
--OR CURRENT RESIDENT--
992 W 950 NORTH
OREM, UT 84057

BILBY PROPERTIES LLC
993 N INDUSTRIAL PK RD
OREM, UT 84057

LYMAN, DAVID SHAY
996 W 950 N
OREM, UT 84057

C & S LEE PROPERTIES LLC
--OR CURRENT RESIDENT--
998 W 950 NORTH
OREM, UT 84057

PAYNE, SHAWN D & TONYA M
1004 W 950 N
OREM, UT 84057

THE HAMMOND COMPANY
--OR CURRENT RESIDENT--
1005 N 1200 WEST
OREM, UT 84057

WILLIAMSON, MARCUS C
1012 W 950 N
OREM, UT 84057

CONTRERAS, BENITO & BENITO
1013 W 1100 N
OREM, UT 84057

ROY, JACQUELINE & JOSEPH
1014 W 1100 N
OREM, UT 84057

HALL, ROBERT JEFFREY & KATHERINE
1016 W 950 N
OREM, UT 84057

SWH LTD
--OR CURRENT RESIDENT--
1018 N 985 WEST UNIT#514
OREM, UT 84057

ADAMS, NICHOLAS M & ALISHA
1018 W 950 N
OREM, UT 84057

MARTINEZ, DONALD R & HARMONY J
1025 W 1140 N
OREM, UT 84057

LARSEN, JAMES & JAMES G
1026 N 1200 W
OREM, UT 84057

KARPOWITZ, KAREN
1027 W 1100 N
OREM, UT 84057

GLOVER, SCOTT K
1028 W 1100 N
OREM, UT 84057

SELK, LOGAN A
1030 N 995 W # 907
OREM, UT 84057

MERO, NEVRUS & ENGJELLUSHE
1030 N 995 W
OREM, UT 84057

CUSICK, CRAIG & SADIE
1030 N 995 W # 906
OREM, UT 84057

HILL, CLAUDIA A
1030 N 995 W # 913
OREM, UT 84057

FISHER, CHASE & TIFFANI
1030 N 995 W # 909
OREM, UT 84057

WOLSEY, ELIZABETH A
1030 N 995 W # 905
OREM, UT 84057

MURILLO, JOSHUA A & JARED
1030 N 995 W # 908
OREM, UT 84057

WEBB, NATALIE
1030 N 995 W # 912
OREM, UT 84057

BIRD, KIMBERLY A
1030 N 995 W # 911
OREM, UT 84057

BOSHARD, DEVRAUX R
1030 N 995 W # 915
OREM, UT 84057

STEWART, KENNETH S & DEBORAH K
1030 N 995 W # 903
OREM, UT 84057

JEEMA V LLC
--OR CURRENT RESIDENT--
1030 N 995 WEST UNIT#901
OREM, UT 84057

MERO, NEVRUS & ENGJELLUSHE
--OR CURRENT RESIDENT--
1030 N 995 WEST UNIT#902
OREM, UT 84057

STEWART, KENNETH S & DEBORAH K
--OR CURRENT RESIDENT--
1030 N 995 WEST UNIT#903
OREM, UT 84057

WOLSEY, ELIZABETH A
--OR CURRENT RESIDENT--
1030 N 995 WEST UNIT#905
OREM, UT 84057

CUSICK, CRAIG & SADIE
--OR CURRENT RESIDENT--
1030 N 995 WEST UNIT#906
OREM, UT 84057

SELK, LOGAN A
--OR CURRENT RESIDENT--
1030 N 995 WEST UNIT#907
OREM, UT 84057

MURILLO, JOSHUA A & JARED
--OR CURRENT RESIDENT--
1030 N 995 WEST UNIT#908
OREM, UT 84057

FISHER, CHASE & TIFFANI
--OR CURRENT RESIDENT--
1030 N 995 WEST UNIT#909
OREM, UT 84057

TOP PROPERTY MANAGEMENT LLC
--OR CURRENT RESIDENT--
1030 N 995 WEST UNIT#910
OREM, UT 84057

BIRD, KIMBERLY A
--OR CURRENT RESIDENT--
1030 N 995 WEST UNIT#911
OREM, UT 84057

WEBB, NATALIE
--OR CURRENT RESIDENT--
1030 N 995 WEST UNIT#912
OREM, UT 84057

HILL, CLAUDIA A
--OR CURRENT RESIDENT--
1030 N 995 WEST UNIT#913
OREM, UT 84057

WATTS, ELIZABETH
--OR CURRENT RESIDENT--
1030 N 995 WEST UNIT#914
OREM, UT 84057

BOSHARD, DEVRAUX R
--OR CURRENT RESIDENT--
1030 N 995 WEST UNIT#915
OREM, UT 84057

FONSECA, WALSTIR H
--OR CURRENT RESIDENT--
1030 N 995 WEST UNIT#916
OREM, UT 84057

RODRIGUEZ, YOLANDA P
1032 W 1140 N
OREM, UT 84057

SWENSEN, GORDON
1035 W 1140 N
OREM, UT 84057

TADZHIMETOV, ERKIN (ET AL)
1044 W 1140 N
OREM, UT 84057

BATTY, PHIL B & ELIZABETH R
1049 N 1005 W
OREM, UT 84057

WHITAKER, ADAM S & KENICE
1049 W 1100 N
OREM, UT 84057

LILJENQUIST, MIKE & LUANNE
1051 N 1005 W
OREM, UT 84057

LAMOREAUX, THOMAS C
1052 GRAND CIR
PROVO, UT 84604

SOMMERS, AUSTIN LEE
1053 N 1035 W
OREM, UT 84057

JACOB, EARL I & LOUISE O
1054 N 1200 W
OREM, UT 84057

HAAS, THOMAS J & LINDA A
--OR CURRENT RESIDENT--
1057 W 1200 NORTH
OREM, UT 84057

988 PROPERTIES LLC
1058 N 500 W
OREM, UT 84057

SOUND PROPERTIES LLC
--OR CURRENT RESIDENT--
1058 W 1100 NORTH
OREM, UT 84057

ROSENTHAL, JACOB W & APRIL
1061 N 1035 W
OREM, UT 84057

DASTRUP, WILLIAM J & BRITTA JO
1062 N 1035 W
OREM, UT 84057

MCKEETH, CORBIN P & HANNAH L
1064 N 1160 W
OREM, UT 84057

FRANKS, ALAN J & SANDRA G
1067 N 1005 W
OREM, UT 84057

SMITH, KELLY D & MARY ANNE
1068 N 1160 W
OREM, UT 84057

ARMENTA, JOSE RAMIRO (ET AL)
1069 N 1035 W
OREM, UT 84057

LONG, MARK D
1069 N 1160 W
OREM, UT 84057

MADSEN, KEVIN & STEPHANIE
1070 N 1035 W
OREM, UT 84057

SENDSATIONS
1074 INDUSTRIAL PARK DR
OREM, UT 84057

CORP OF THE PRES BISHOP CHURCH
OF JESUS CHRIST OF L D S
--OR CURRENT RESIDENT--
1075 W 1100 NORTH
OREM, UT 84057

PEREZ, NORBERTO (ET AL)
1076 N 1160 W
OREM, UT 84057

MCDANIEL, DOUGLAS WAYNE &
KRISTINE
1077 N 1160 W
OREM, UT 84057

MARTIN, BENJAMIN D
1077 W 1130 N
OREM, UT 84057

ABILDSKOV, TRACY JOHN & CAROL
MARIE
1077 W 1200 N
OREM, UT 84057

JIMENEZ, MIGUEL A
1078 W 1100 N
OREM, UT 84057

GAMMELL, BRANDI
1079 W 965 N # 201
OREM, UT 84057

LESTARI, FARLEY
1079 W 965 N # 103
OREM, UT 84057

GARRARD, JENNIFER ANN
1079 W 965 N # 403
OREM, UT 84057

BACCUS, LINDSAY
1079 W 965 N # 402
OREM, UT 84057

CUTLER, PRESTON (ET AL)
1079 W 965 N # 401
OREM, UT 84057

JACKMAN, TRAVIS S & JENNALEE R
1079 W 965 N # 110
OREM, UT 84057

SMITH, SEAN & MORGAN
1079 W 965 N # 302
OREM, UT 84057

DE LA CRUZ, GLORIA
1079 W 965 N # 303
OREM, UT 84057

MORLEY, RYAN
1079 W 965 N # 301
OREM, UT 84057

MILLS, KELSEY RAE
1079 W 965 N # 404
OREM, UT 84057

FRY, PETER M
1079 W 965 N # 304
OREM, UT 84058

KAM INDUSTRIES LLC
1080 N INDUSTRIAL PARK DR
OREM, UT 84057

SHAW, TYLER J & KYLEE
1080 W 965 N # 205
OREM, UT 84057

SCHROEPPEL, ASHLEE A
1080 W 965 N UNIT 305
OREM, UT 84057

DAVIDSON, JOAN H
1080 W 965 N # 102
OREM, UT 84057

BLACKETT, CODY T & ALICIA A
1080 W 965 N # 405
OREM, UT 84057

JARROW, ZACHARY O & YOANI
1080 W 965 N # 104
OREM, UT 84057

MOORE, SARA L
1080 W 965 N # 204
OREM, UT 84057

JONES, ROBERT G & AMANDA K
1086 N 1005 W
OREM, UT 84057

PLANNED PARENTHOOD
ASSOCIATION OF UTAH
--OR CURRENT RESIDENT--
1086 N 1200 WEST
OREM, UT 84057

CHATWIN, WESLEY T & MYSTIE D
1087 N 1160 W
OREM, UT 84057

ASAY, MARK FOSTER & MARILYN
KAY
1088 N 1160 W
OREM, UT 84057

MURRAY, DEWARD N & JILENE W
1088 W 1100 N
OREM, UT 84057

CARROLL, GREGORY M & JANICE W
1089 W 1200 N
OREM, UT 84057

DILLEY, LESLIE R & ANGELA F
1091 W 1130 N
OREM, UT 84057

PHCD LLC (ET AL)
--OR CURRENT RESIDENT--
1092 N INDUSTRIAL PARK DR
OREM, UT 84057

CPH HOLDINGS LLC
--OR CURRENT RESIDENT--
1094 N 1300 WEST
OREM, UT 84057

SPENCER, SUSAN K & SCOTT M
1098 W 1100 N
OREM, UT 84057

BOWLDEN, KIM W & DONNA L
1101 W 1200 N
OREM, UT 84057

KCJ INC
--OR CURRENT RESIDENT--
1102 N 1200 WEST
OREM, UT 84057

WHATCOTT, DIRK ALLEN & CHERYL
ANN
1103 W 1130 N
OREM, UT 84057

ROUNDY, NATHAN GLEN & BRENDA
HOWLETT
1106 W 1200 N
OREM, UT 84057

CHANTRY, BRIAN N & JENNIFER C
1109 N 1125 W
OREM, UT 84057

ORTIZ, SALVADOR C & AMADA S
--OR CURRENT RESIDENT--
1110 W 1100 NORTH
OREM, UT 84057

HENRIE, LARRY J & ALEXIA D
1112 N 1165 W
OREM, UT 84057

YOUNG, ROBERT D & ROLAYNE H
1114 N 1050 W
OREM, UT 84057

HALE, DAVID B & JANELLE
1115 W 1130 N
OREM, UT 84057

DIAZ, RODOLFO A (ET AL)
--OR CURRENT RESIDENT--
1116 W 1130 NORTH
OREM, UT 84057

JOHNSON, WILLIAM R & ROSEMARY
1117 N 1125 W
OREM, UT 84057

LEDEZMA, FILIBERTO S
1118 N 1165 W
OREM, UT 84057

S A B B LLC
--OR CURRENT RESIDENT--
1118 N 1200 WEST
OREM, UT 84057

JONES, CRAIG R & SUSAN M
--OR CURRENT RESIDENT--
1119 N 1300 WEST
OREM, UT 84057

CANNON, TRESSA J & TODD R
1120 W 1100 N
OREM, UT 84057

HOWLETT, DANIEL & KATHY J
1120 W 1200 N
OREM, UT 84057

RLJ PROPERTIES LC
--OR CURRENT RESIDENT--
1122 N 1200 WEST
OREM, UT 84057

ERCANBRACK, BENJAMIN & BENJAMIN
--OR CURRENT RESIDENT--
1124 N 1300 WEST
OREM, UT 84057

WRIGHT, ANDREW D & NATALIE P
1125 N 1050 W
OREM, UT 84057

PREECE WORLD LLC
--OR CURRENT RESIDENT--
1126 N 1050 WEST
OREM, UT 84057

DE BOKETON PROPERTIES LLC
1126 N 1200 W
OREM, UT 84057

GROW, VON
1128 N 1165 W
OREM, UT 84057

BLOCKER, STEVEN K & BRENDA
1129 N 1125 W
OREM, UT 84057

RODRIGUEZ, JUAN L & MARIA A
1134 N 1080 W
OREM, UT 84057

FLETCHER, WILLIAM JAY & DEBRA M
1134 W 1200 N
OREM, UT 84057

DAGOSTINI, DANTE K
1135 W 1100 N
OREM, UT 84057

THILL, JOSHUA M
1137 N 1050 W
OREM, UT 84057

TORRES, NOE (ET AL)
1138 N 1165 W
OREM, UT 84057

CHIPMAN, MICHAEL
1139 N 1080 W
OREM, UT 84057

GORDON, KEVIN RULON & KATHLEEN D
1139 N 1165 W
OREM, UT 84057

DGJAYS LLC
1140 N 1200 W
OREM, UT 84057

KNIGHT, DAVID P & COURTNEY P
1141 N 1125 W
OREM, UT 84057

MILLER, DAVID L & ANGELA
1142 N 1080 W
OREM, UT 84057

JOHNSON, MICHAEL LOUIS JR & JOLENE FAYE
1143 N 1050 W
OREM, UT 84057

CANO, JAVIER
1146 W 1100 N
OREM, UT 84057

MILIEN, GLADIMIR & JOANNE
1148 W 1200 N
OREM, UT 84057

SIMMONS, ROBYN J
1149 N 1080 W
OREM, UT 84057

PEREZ, ROSABLA
1150 N 1165 W
OREM, UT 84057

KEIL, JESSICA
1151 N 1165 W
OREM, UT 84057

PAINTER, KATHRYN
1153 N 1125 W
OREM, UT 84057

LE BELL, ANN MARIE
1154 N 1050 W
OREM, UT 84057

COX, JAMES D & MARY B
1154 N 1080 W
OREM, UT 84057

WINN, DEBORAH S
--OR CURRENT RESIDENT--
1154 N 1125 WEST
OREM, UT 84057

HOWLETT, BRADLEY D & MELEA
1155 N 1050 W
OREM, UT 84057

LANCASTER, AARON D & SHANNON J
--OR CURRENT RESIDENT--
1159 N 1165 WEST
OREM, UT 84057

SOLIS, JORGE
1160 N 1165 W
OREM, UT 84057

PREMIER FUNERAL HOLDINGS LLC
--OR CURRENT RESIDENT--
1160 N 1200 WEST
OREM, UT 84057

800 NORTH RETAIL LLC
--OR CURRENT RESIDENT--
1160 W 800 NORTH
OREM, UT 84057

HURST, DEAN W & TENA
1163 N 1080 W
OREM, UT 84057

CROFTS, CHARLEEN M
1163 N 1125 W
OREM, UT 84057

YOUNG, VICKY JO-ANNA
--OR CURRENT RESIDENT--
1164 N 1080 WEST
OREM, UT 84057

HALLS, KARIN
--OR CURRENT RESIDENT--
1166 N 1050 WEST
OREM, UT 84057

MORTENSEN, DEEVERE FUNK & ROSEMARY HARRISON
1166 N 1125 W
OREM, UT 84057

BAXTER, KEVIN K & MARTHA S
1167 N 1050 W
OREM, UT 84057

WILSON, GREGORY L & KATHLEEN R
--OR CURRENT RESIDENT--
1170 N INDUSTRIAL PARK RD
OREM, UT 84057

BELL, LOREN A & SHELLIE D
1172 N 1080 W
OREM, UT 84057

ROCK, DAVID E & MARTA J
--OR CURRENT RESIDENT--
1172 N 1165 WEST
OREM, UT 84057

STEINAGEL, JACK LEE & SHIRLEY IRENE
--OR CURRENT RESIDENT--
1173 N 1080 WEST
OREM, UT 84057

CLOWARD, BERNELL R & KAREN C
--OR CURRENT RESIDENT--
1173 N 1165 WEST
OREM, UT 84057

CLOWARD, BERNELL R & KAREN C
1173 N 1165 W
OREM, UT 84058

TAYLOR, RAYMOND G
1174 W 1200 N
OREM, UT 84057

NORDLUND, NATALIE & ISAAC T
1175 N 1125 W
OREM, UT 84057

RODEN, SAM & JAICEE
1178 N 1125 W
OREM, UT 84057

MUNSON, ROBERT S & MELODY H
1179 N 1050 W
OREM, UT 84057

JBR INVESTMENTS LLC
1180 E SHERWOOD DR
KAYSVILLE, UT 84037

HELSTEN, LANCE FINN & BRENDA L
1180 N 1165 W
OREM, UT 84057

MC DONALD'S REAL ESTATE COMPANY
--OR CURRENT RESIDENT--
1180 W 800 NORTH
OREM, UT 84057

PRICE, CORY & STEFANIE
1181 N 1165 W
OREM, UT 84057

BLAKER, BENJAMIN A & LAURA A
1186 N 1165 W
OREM, UT 84057

GUNNELL, BRAD
1186 W 1200 N
OREM, UT 84057

JENKINS, BENJAMIN J & BETHANY
1187 N 1125 W
OREM, UT 84057

12X12NW LLC
--OR CURRENT RESIDENT--
1187 N 1200 WEST
OREM, UT 84057

ORR, NATALIE
1190 N 1125 W
OREM, UT 84057

JACKMAN, JERRY R & CAROLE M
1190 N 1200 W
OREM, UT 84057

MILIEN, GLADIMIR & JOANNE
--OR CURRENT RESIDENT--
1214 N 1160 WEST
OREM, UT 84057

LANCASTER, AARON D & SHANNON J
1283 BAYLEAF TERRACE AV
HENDERSON, NV 89014

BLEAK, NATHAN & STEPHANIE
1286 W 1980 N
PROVO, UT 84604

JACOB LAND DEVELOPMENT LLC
--OR CURRENT RESIDENT--
1304 W 1170 NORTH
OREM, UT 84057

WILSON, GREGORY L & KATHLEEN R
1330 W 400 N
OREM, UT 84057

BETHERS, LARRY & VERNETTA
1370 W 1460 N
PROVO, UT 84604

JONES, CRAIG R & SUSAN M
1420 BRETTON DR
CASPER, WY 82609

CALDWELL, BRADLEY R & REBECCA L
1445 S 100 W
OREM, UT 84058

TIMP VALLEY LLC
1483 SPRINGDELL DR
PROVO, UT 84604

12X12NW LLC
1513 N TECHNOLOGY WY # 2100
OREM, UT 84097

QUESTAR GAS COMPANY
1640 NORTH MTN. SPRINGS PKWY.
SPRINGVILLE, UT 84663

ORTIZ, SALVADOR C & AMADA S
1751 N 980 W
OREM, UT 84057

DIAZ, RODOLFO A (ET AL)
1799 N 950 W APT 3
PROVO, UT 84604

800 NORTH RETAIL LLC
1820 S ESCONDIDO BLVD STE 205
ESCONDIDO, CA 92025

DEBBY LAURET
1869 N 80 E
OREM, UT 84057

GARY & OLEAH PEAY
ASPEN NEIGHBORHOOD CHAIR
1895 N 800 WEST
OREM, UT 84057

JASON BENCH
1911 N MAIN STREET
OREM, UT 84057-2101

UTAH CNTY SOLID WASTE DISTRICT
C/O RODGER HARPER
2000 WEST 200 SOUTH
LINDON, UT 84042

EB WEBB LLC
2150 N CENTER ST
LEHI, UT 84043

UTOPIA
2175 S REDWOOD ROAD
WEST VALLEY CITY, UT 84119

KCJ INC
%CHORNIAK, HAZEL
2310 SKYLINE MOUNTAIN RESORT
FAIRVIEW, UT 84629

S A B B LLC
3017 W 120 N
PROVO, UT 84601

WATTS, ELIZABETH
3137 E SAN ANGELO AV
GILBERT, AZ 85234

C & S LEE PROPERTIES LLC
3219 LAURELWOOD DR
TWIN FALLS, ID 83301

HERINGER SALES AND SERVICE INC
3598 N 1450 W
PLEASANT GROVE, UT 84062

THE HAMMOND COMPANY
3664 FOOTHILL DR
PROVO, UT 84604

RLJ PROPERTIES LC
4115 N 200 E
PROVO, UT 84604

PHCD LLC (ET AL)
%COOK, PAUL H
4886 N 200 E
PROVO, UT 84604

MAYO, DAVID (ET AL)
6630 CASTLE DR
BLOOMFIELD HILLS, MI 48301

PREMIER FUNERAL HOLDINGS LLC
7043 S COMMERCE PARK DR
MIDVALE, UT 84047

MYHRE HOLDINGS-OREM LLC
8089 GLOBE DR
WOODBURY, MN 55125

LEWIS, FLORIDALMA
8619 S SANDY PKY STE 111 BLDG A
SANDY, UT 84070

COMCAST
9602 SOUTH 300 WEST
SANDY, UT 84070

YOUNG, VICKY JO-ANNA
10100 THRIFT RD
CLINTON, MD 20735

TOP PROPERTY MANAGEMENT LLC
%CHRISTENSEN, LESLIE
10136 MYSTIC DR
HIGHLAND, UT 84003

POZO, GABY & MICHAEL ERIK
12523 VARENNA ST
HERRIMAN, UT 84096

ROCK, DAVID E & MARTA J
12618 BEXHILL DR
HOUSTON, TX 77065

NORTHGATE VILLAGE
DEVELOPMENT LC
PO BOX 1234
OREM, UT 84059

GREENFIELD INVESTMENTS LC
PO BOX 1239
OREM, UT 84059

ZEBRA ASSET MANAGEMENT LLC
PO BOX 1481
OREM, UT 84059

FORSMAN, DANIEL B & TRUDY H
PO BOX 1715
PROVO, UT 84603

MC DONALD'S REAL ESTATE
COMPANY
PO BOX 182571
COLUMBUS, OH 43218

WINCO FOODS LLC
%TAX DEPARTMENT
PO BOX 5756
BOISE, ID 83705

DAVENPORT, THOMAS N
PO BOX 754
PROVO, UT 84603

HART, ROLAND J
20 TIMBERLINE TRL
LANDER, WY 82520

CORP OF PRES BISHOP CHURCH OF
JESUS CHRIST OF LDS
50 E NORTH TEMPLE
SALT LAKE CITY, UT 84150

TLB2 LLC
51 W CENTER # 420
OREM, UT 84057

TLB2 LLC
51 W CENTER ST # 420
OREM, UT 84057

KRISTIE SNYDER
56 N STATE STREET
OREM, UT 84057

CRAWFORD, GARY L & KATHRYN A
79 N PALISADES DR
OREM, UT 84097

COMMON AREA
100 E CENTER ST
PROVO, UT 84606

WILLIAMSON RENTALS LC
168 N 1200 E
OREM, UT 84097

WASHBURN, PAUL V & STEFFANI
172 S 165 W
OREM, UT 84057

WASHBURN, PAUL V & STEFFANI Y
(ET AL)
172 S 165 W
OREM, UT 84058

WRIGHT, RODNEY K & LINDA F
191 SHADOW BREEZE RD
KAYSVILLE, UT 84037

WILLIAMSON RENTALS LC
195 S GENEVA RD
LINDON, UT 84042

SANFORD, BRIAN
197 COURTNEY ANN DR
HENDERSON, NV 89074

HANSEN GROUP THE LC (ET AL)
201 W 3200 N
PROVO, UT 84604

NIEDENS BROADWATER LLC
214 SILVER CLOUD CIR
BOZEMAN, MT 59715

WILLIAMSON, TYSON D & AUDRA
MAY
292 N 860 E
AMERICAN FORK, UT 84003

BELKIN, MATTHEW W
342 W 200 S APT 201
SALT LAKE CITY, UT 84101

CARSON, MICHAEL H
367 N STATE ST
OREM, UT 84057

SUITE PROPERTIES LC
%DASTRUP, MERRILL
368 S 850 W
OREM, UT 84058

GERULAT, NICOLE C
375 HAMPTON AV
SALT LAKE CITY, UT 84111

WHITTAKER INVESTMENTS LLC
415 W 750 S
OREM, UT 84058

GALLAND, GARY & DEVON
432 SHEFFIELD DR
PROVO, UT 84604

GALLAND, GARY
432 W SHEFFIELD DR
PROVO, UT 84606

WILLIAMSON, JERRY D & JOAN H (ET AL)
455 E 1600 S
OREM, UT 84097

MANN, CHRISTOPHER & ASHLIE
470 W 750 S
OREM, UT 84058

NORTHGATE VILLAGE DEVELOPMENT LC
507 N 1500 W
OREM, UT 84057

RIRIE PROPERTIES LLC
518 N 1980 E
SPANISH FORK, UT 84660

OLSEN, JACK D & GAE H
538 N 80 W
LINDON, UT 84042

MURILLO, JARED M & ALEX
575 N 1200 W
OREM, UT 84057

CROOK, JORDAN TAYLOR & KENNETH L (ET AL)
650 E CENTER ST
ALPINE, UT 84004

CAMERON, BRUCE & MARCIA
658 N BELLA VISTA DR
OREM, UT 84097

BRIAN & LISA KELLY
TIMPVIEW NEIGHBORHOOD CHAIR
668 W 1325 NORTH
OREM, UT

CHRISTENSEN, GORDON J & RELLA P
675 E 900 S
MAPLETON, UT 84664

LEE, MICHAEL VALLANT & JULIE A
714 W 550 S
OREM, UT 84058

CRITCHFIELD, C JAY & LOIS J
725 S 200 W
OREM, UT 84058

CRUMP PROPERTY LLC
811 N 900 W
OREM, UT 84057

SUMTAY PROPERTIES #2 LLC
813 N 900 W
OREM, UT 84058

NELSON ENTERPRISES LLC
--OR CURRENT RESIDENT--
816 N 980 WEST
OREM, UT 84057

WASHBURN, PAUL V & STEFFANI
--OR CURRENT RESIDENT--
817 N 900 WEST
OREM, UT 84057

KCM HOLDINGS LLC
--OR CURRENT RESIDENT--
819 N 900 WEST
OREM, UT 84057

EXCEL PROPERTIES OREM LLC
820 N 980 W
OREM, UT 84057

GREENFIELD INVESTMENTS LC
--OR CURRENT RESIDENT--
822 N 980 WEST
OREM, UT 84057

WASHBURN, PAUL V (ET AL)
825 N 900 W
OREM, UT 84057

WASHBURN, PAUL V (ET AL)
830 N 980 W
OREM, UT 84057

NIEDENS BROADWATER LLC
--OR CURRENT RESIDENT--
833 N 900 WEST
OREM, UT 84057

WASHBURN, PAUL V (ET AL)
--OR CURRENT RESIDENT--
840 N 980 WEST
OREM, UT 84057

RENAISSANCE WATERBEDS AND FUNITURE OF LINDON INC
--OR CURRENT RESIDENT--
841 N 900 WEST
OREM, UT 84057

CENTER RIDGE PROPERTY MANAGEMENT LLC
--OR CURRENT RESIDENT--
848 N 980 WEST
OREM, UT 84057

LEE, MICHAEL VALLANT & JULIE A
--OR CURRENT RESIDENT--
851 N 900 WEST
OREM, UT 84057

RIRIE PROPERTIES LLC
--OR CURRENT RESIDENT--
859 N 900 WEST
OREM, UT 84057

TLB2 LLC
--OR CURRENT RESIDENT--
860 N 980 WEST
OREM, UT 84057

CRITCHFIELD, C JAY & LOIS J
--OR CURRENT RESIDENT--
864 N 980 WEST
OREM, UT 84057

JACKMAN, FREDERICK A & FREDERICK V (ET AL)
--OR CURRENT RESIDENT--
867 N 900 WEST
OREM, UT 84057

JACKMAN, FREDERICK A &
FREDERICK V (ET AL)
867 N 900 W # 307
OREM, UT 84057

TLB2 LLC
--OR CURRENT RESIDENT--
870 N 980 WEST
OREM, UT 84057

SPERRY, ROBERT LYMAN
881 N 900 W
OREM, UT 84057

JACKMAN, FREDERICK A
883 N 900 W
OREM, UT 84057

EDGAR, SAMUEL & ERIN
887 N 900 W
OREM, UT 84057

CHRISTENSEN, GORDON J & RELLA P
--OR CURRENT RESIDENT--
891 N 900 WEST
OREM, UT 84057

OPENSHAW, ROBYN
893 N 900 W
OREM, UT 84057

GODFREY, NADENE
894 N 960 W
OREM, UT 84057

GODFREY, NADENE
--OR CURRENT RESIDENT--
894 N 980 WEST
OREM, UT 84057

SANFORD, BRIAN
--OR CURRENT RESIDENT--
895 N 920 WEST
OREM, UT 84057

WINCO FOODS LLC
--OR CURRENT RESIDENT--
895 N 980 WEST
OREM, UT 84057

CONNOR G LLC
--OR CURRENT RESIDENT--
896 N 940 WEST
OREM, UT 84057

CHILD, BENJAMIN D
897 N 900 W
OREM, UT 84057

HABIBULLAH, SALMAN R (ET AL)
898 N 980 W
OREM, UT 84057

HOYT, LARRY & SUZANN
--OR CURRENT RESIDENT--
899 N 920 WEST
OREM, UT 84057

MAYOR RICHARD F. BRUNST, JR.
900 E HIGH COUNTRY DRIVE
OREM, UT 84097-2389

NEILSON, ROBERT T & SARAH
ELIZABETH WHEATLEY
902 N 940 W
OREM, UT 84057

GALLAND, GARY & DEVON
--OR CURRENT RESIDENT--
904 N 960 WEST
OREM, UT 84057

GERULAT, NICOLE C
--OR CURRENT RESIDENT--
905 N 920 WEST
OREM, UT 84057

MURILLO, JARED M & ALEX
--OR CURRENT RESIDENT--
906 N 980 WEST
OREM, UT 84057

STRATTON, CONNIE
--OR CURRENT RESIDENT--
907 N 900 WEST
OREM, UT 84057

LEE, CHRISTOPHER C & ANDREA D
908 N 940 W
OREM, UT 84057

WATTS, EMMELINE
909 N 940 W
OREM, UT 84057

LULLOFF, JANEAN & BRIAN
910 N 960 W
OREM, UT 84057

BARRY, DEAN & JENNIFER L
912 N 980 W
OREM, UT 84057

GOULDING, DARETH & JESSE
913 N 920 W
OREM, UT 84057

WHEELER, MICHAEL
914 N 940 W
OREM, UT 84057

BLEAK, NATHAN & STEPHANIE
--OR CURRENT RESIDENT--
915 N 940 WEST
OREM, UT 84057

GATES, JAY C
916 N 960 W
OREM, UT 84057

HOYT, RYAN L & CARINA S
918 N 960 W
OREM, UT 84057

PRATT, STEPHEN W & CAMMIE
920 N 960 W
OREM, UT 84057

BLEAK, BRYAN JAMES & JENNIE
921 N 940 W
OREM, UT 84057

GALLAND, GARY
923 N 920 W
OREM, UT 84057

MC CANN, DARIN R
923 W 965 N
OREM, UT 84057

FAERBER, ALMA
924 N 980 W
OREM, UT 84057

IAM, ADHIS
925 N 900 W
OREM, UT 84057

CRAWFORD, GARY L & KATHRYN A
--OR CURRENT RESIDENT--
926 N 940 WEST
OREM, UT 84057

HART, ROLAND J
--OR CURRENT RESIDENT--
926 W 880 NORTH
OREM, UT 84057

YOUNGQUIST, AMBER
927 N 940 W
OREM, UT 84057

WRIGHT, RODNEY K & LINDA F
--OR CURRENT RESIDENT--
927 W 965 NORTH
OREM, UT 84057

SYCAMORE FAMILY LLC
928 N 960 W
OREM, UT 84057

FASLIJA, CAROL Y
928 W 880 N
OREM, UT 84057

BELKIN, MATTHEW W
--OR CURRENT RESIDENT--
929 N 900 WEST
OREM, UT 84057

GALLAND, GARY
--OR CURRENT RESIDENT--
930 W 880 NORTH
OREM, UT 84057

ECKLES, MARIE P
--OR CURRENT RESIDENT--
931 W 965 NORTH
OREM, UT 84057

ECKLES, MARIE P
931 W 965 N
OREM, UT 84058

ARNOLD, GARY
932 N 940 W
OREM, UT 84057

CAMERON, MICHAEL C
932 W 880 N
OREM, UT 84057

TITTENSOR, ZACHARY S & JENNIFER
--OR CURRENT RESIDENT--
933 N 900 WEST
OREM, UT 84057

SYCAMORE FAMILY LLC
--OR CURRENT RESIDENT--
934 N 980 WEST
OREM, UT 84057

BAMBL, MATT
934 W 880 N
OREM, UT 84057

WOOD, GORDON S & TIFFANY H (ET AL)
935 W 965 N
OREM, UT 84057

AMADOR, MICHELLE
937 N 940 W
OREM, UT 84057

CARSON, MICHAEL H
--OR CURRENT RESIDENT--
938 N 940 WEST
OREM, UT 84057

JUDKINS, DARRELL WAYNE & SHERRI
938 N 960 W
OREM, UT 84057

SUITE PROPERTIES LC
--OR CURRENT RESIDENT--
938 N 980 WEST
OREM, UT 84057

WOOD, KARI M
939 N 900 W
OREM, UT 84057

ELDER, GEOFFREY SCOTT & STACY M
939 W 965 N
OREM, UT 84057

AHN, SOO YOUNG
%ALEXANDER, SOO YOUNG AHN
941 N 940 W
OREM, UT 84057

GRAVES, HOPE
942 N 940 W
OREM, UT 84057

JONES, CHARLES R & ATHENA ANN
943 N 900 W
OREM, UT 84057

HOYT, CHARLES LAURENCE & SUZANN
943 W 965 N
OREM, UT 84057

MC CANN, DANIEL MARCUS REESE & JESSICA A
--OR CURRENT RESIDENT--
944 N 980 WEST
OREM, UT 84057

MANN, CHRISTOPHER & ASHLIE
--OR CURRENT RESIDENT--
944 W 880 NORTH
OREM, UT 84057

VANEE' BURGESS ASHBY LLC
945 N 920 W
OREM, UT 84057

PHILLIPS, ANDREA
945 N 940 W
OREM, UT 84057

YU, LINA (ET AL)
946 N 940 W
OREM, UT 84057

HART, JOSH STEVEN & ANGELA
946 W 880 N
OREM, UT 84057

STOLZE, MICHAEL R & KATHY V (ET AL)
947 N 900 W
OREM, UT 84057

SCHNEIDER, GLEN L
948 W 880 N
OREM, UT 84057

KERSHAW, LYNN G & SUSAN J
949 N 920 W
OREM, UT 84057

ARGAEZ, HUMBERTO & PRISCILA
949 N 940 W
OREM, UT 84057

HOYT DENTAL 401(K) PROFIT SHARING PLAN
--OR CURRENT RESIDENT--
949 W 965 NORTH
OREM, UT 84057

WHITTAKER INVESTMENTS LLC
--OR CURRENT RESIDENT--
950 N 940 WEST
OREM, UT 84057

SPERRY, MICHAEL GORDON
950 W 880 N
OREM, UT 84057

TIPPETS, LEWIS R & KAREN A
951 N 900 W
OREM, UT 84057

CROOK, JORDAN TAYLOR & KENNETH L (ET AL)
--OR CURRENT RESIDENT--
953 N 920 WEST
OREM, UT 84057

WILLIAMSON, TYSON D & AUDRA MAY
--OR CURRENT RESIDENT--
953 W 965 NORTH
OREM, UT 84057

REDD, JEANNE H
954 N 940 W
OREM, UT 84057

WELLEN, STEPHEN R & SANDRA P
--OR CURRENT RESIDENT--
955 N 900 WEST
OREM, UT 84057

THRUSTON, HOWARD II (ET AL)
957 N 920 W
OREM, UT 84057

ZHANG, XINYOU (ET AL)
957 W 965 N
OREM, UT 84057

ENGLE, KOZETTE
958 N 940 W
OREM, UT 84057

KENDALL, KIMBERLEE ELIZABETH & KIMBERLEE ELIZABETH
958 W 880 N
OREM, UT 84057

GALLAND, MASON S & ALYXANDRA K
961 N 920 W
OREM, UT 84057

TAYLOR, ROGAN L
962 W 880 N
OREM, UT 84057

MOULTON, MICHAEL B
963 N 900 W
OREM, UT 84057

CAMERON, BRUCE & MARCIA
--OR CURRENT RESIDENT--
966 W 880 NORTH
OREM, UT 84057

PHILLIPS, TERESA A
969 N 920 W
OREM, UT 84057

CLYDE, TYLER & LAUREN
--OR CURRENT RESIDENT--
970 W 880 NORTH
OREM, UT 84057

HALES, JANET F
971 N 900 W
OREM, UT 84057

GIBBS, GAYE
973 N 920 W
OREM, UT 84057

COOPER, CINDY D
975 N 900 W
OREM, UT 84057

NIELSEN, J CARY & ALLISON B
--OR CURRENT RESIDENT--
977 N 920 WEST
OREM, UT 84057

ZEBRA ASSET MANAGEMENT LLC
--OR CURRENT RESIDENT--
979 N 900 WEST
OREM, UT 84057

HANSEN GROUP THE LC (ET AL)
--OR CURRENT RESIDENT--
980 W 960 NORTH
OREM, UT 84057

PALICA, TRACY
--OR CURRENT RESIDENT--
983 N 900 WEST
OREM, UT 84057

WILLIAMS, KEVIN J & BONNIE
--OR CURRENT RESIDENT--
983 N 920 WEST
OREM, UT 84057

WILLIAMS, KEVIN J & BONNIE
983 N 920 WEST 71
OREM, UT 84057

HAINSWORTH, JASON E (ET AL)
983 W 1055 N # 809
OREM, UT 84057

FREESTONE, JENNI
983 W 1055 N # 802
OREM, UT 84057

HARRISON, CURTIS J & KAILEY A (ET AL)
983 W 1055 N # 814
OREM, UT 84057

HANSEN, CHRISTOPHER G & REBECA A
983 W 1055 N # 807
OREM, UT 84057

BUCHANAN, KAYLE K & CANDICE O
983 W 1055 N # 803
OREM, UT 84057

COX, STEPHANIE J
983 W 1055 N # 805
OREM, UT 84057

AVILES, CIRENIA
983 W 1055 N # 808
OREM, UT 84057

WILLARDSON, CRAIG A & JOAN ELIZABETH (ET AL)
--OR CURRENT RESIDENT--
983 W 1055 NORTH UNIT#801
OREM, UT 84057

FREESTONE, JENNI
--OR CURRENT RESIDENT--
983 W 1055 NORTH UNIT#802
OREM, UT 84057

BUCHANAN, KAYLE K & CANDICE O
--OR CURRENT RESIDENT--
983 W 1055 NORTH UNIT#803
OREM, UT 84057

WILLIAMSON RENTALS LC
--OR CURRENT RESIDENT--
983 W 1055 NORTH UNIT#804
OREM, UT 84057

COX, STEPHANIE J
--OR CURRENT RESIDENT--
983 W 1055 NORTH UNIT#805
OREM, UT 84057

DAVENPORT, THOMAS N
--OR CURRENT RESIDENT--
983 W 1055 NORTH UNIT#806
OREM, UT 84057

HANSEN, CHRISTOPHER G & REBECA A
--OR CURRENT RESIDENT--
983 W 1055 NORTH UNIT#807
OREM, UT 84057

AVILES, CIRENIA
--OR CURRENT RESIDENT--
983 W 1055 NORTH UNIT#808
OREM, UT 84057

HAINSWORTH, JASON E (ET AL)
--OR CURRENT RESIDENT--
983 W 1055 NORTH UNIT#809
OREM, UT 84057

THORESEN, STEPHEN L & MARY ANN
--OR CURRENT RESIDENT--
983 W 1055 NORTH UNIT#810
OREM, UT 84057

BREMS, KENYON P & SHAYLI M
--OR CURRENT RESIDENT--
983 W 1055 NORTH UNIT#811
OREM, UT 84057

TOP PROPERTY MANAGEMENT LLC
--OR CURRENT RESIDENT--
983 W 1055 NORTH UNIT#812
OREM, UT 84057

MALLORY, KEVIN G
--OR CURRENT RESIDENT--
983 W 1055 NORTH UNIT#813
OREM, UT 84057

HARRISON, CURTIS J & KAILEY A (ET AL)
--OR CURRENT RESIDENT--
983 W 1055 NORTH UNIT#814
OREM, UT 84057

ANDERSON, WHITNEY
--OR CURRENT RESIDENT--
983 W 1055 NORTH UNIT#815
OREM, UT 84057

SPROAT, ETHAN M & LIBERTY P
986 W 960 N
OREM, UT 84097

GRAY, JORDAN L
993 N 900 W
OREM, UT 84057

BANK OF UTAH
--OR CURRENT RESIDENT--
1000 W 800 NORTH
OREM, UT 84057

CLYDE, TYLER & LAUREN
1014 S 300 W
LEHI, UT 84043

DUNN, CARRIE
1023 N 900 W
OREM, UT 84057

MCKEETH, CORBIN P & HANNAH L
1064 N 1160 W
OREM, UT 84057

DDO-UTAH LLC
--OR CURRENT RESIDENT--
1130 W 800 NORTH
OREM, UT 84057

JBR INVESTMENTS LLC
1180 E SHERWOOD DR
KAYSVILLE, UT 84037

THORESEN, STEPHEN L & MARY ANN
1264 E 530 N
OREM, UT 84097

TOP PROPERTY MANAGEMENT LLC
--OR CURRENT RESIDENT--
983 W 1055 NORTH UNIT#816
OREM, UT 84057

NEVES, JEREMY D
989 N 900 W
OREM, UT 84057

LYMAN, DAVID SHAY
996 W 950 N
OREM, UT 84057

PAYNE, SHAWN D & TONYA M
1004 W 950 N
OREM, UT 84057

HALL, ROBERT JEFFREY & KATHERINE
1016 W 950 N
OREM, UT 84057

WILLIAMSON RENTALS LC
--OR CURRENT RESIDENT--
1025 N 920 WEST UNIT# 1016
OREM, UT 84057

LONG, MARK D
1069 N 1160 W
OREM, UT 84057

CORP OF PRES BISHOP CHURCH OF JESUS CHRIST OF LDS
--OR CURRENT RESIDENT--
1140 W 950 NORTH
OREM, UT 84057

MC DONALD'S REAL ESTATE COMPANY
--OR CURRENT RESIDENT--
1180 W 800 NORTH
OREM, UT 84057

BLEAK, NATHAN & STEPHANIE
1286 W 1980 N
PROVO, UT 84604

SPROAT, ETHAN M & LIBERTY P
--OR CURRENT RESIDENT--
986 W 950 NORTH
OREM, UT 84057

WILLIAMSON, JERRY D & JOAN H (ET AL)
--OR CURRENT RESIDENT--
992 W 950 NORTH
OREM, UT 84057

C & S LEE PROPERTIES LLC
--OR CURRENT RESIDENT--
998 W 950 NORTH
OREM, UT 84057

WILLIAMSON, MARCUS C
1012 W 950 N
OREM, UT 84057

ADAMS, NICHOLAS M & ALISHA
1018 W 950 N
OREM, UT 84057

OLSEN, JACK D & GAE H
--OR CURRENT RESIDENT--
1045 N 1160 WEST
OREM, UT 84057

SORENSEN INVESTMENT
--OR CURRENT RESIDENT--
1100 W 800 NORTH
OREM, UT 84057

800 NORTH RETAIL LLC
--OR CURRENT RESIDENT--
1160 W 800 NORTH
OREM, UT 84057

PALICA, TRACY
1229 S 1100 E
OREM, UT 84097

KCM HOLDINGS LLC
%MAUGHAN, KENNTHE
1406 NARRA PL
PLEASANT GROVE, UT 84062

NELSON ENTERPRISES LLC
1629 VIA MONTEMAR
PALOS VERDES ESTATES, CA 90274

MC CANN, DANIEL MARCUS REESE & JESSICA A
1714 N 850 W
OREM, UT 84057

RENAISSANCE WATERBEDS AND FUNITURE OF LINDON INC
1755 BLUEBIRD RD
OREM, UT 84097

MALLORY, KEVIN G
1787 W 410 N
LINDON, UT 84042

800 NORTH RETAIL LLC
1820 S ESCONDIDO BLVD STE 205
ESCONDIDO, CA 92025

JASON BENCH
1911 N MAIN STREET
OREM, UT 84057-2101

CENTER RIDGE PROPERTY MANAGEMENT LLC
1912 W 930 N
PLEASANT GROVE, UT 84062

BREMS, KENYON P & SHAYLI M
2494 APRICOT PL
SARATOGA SPRINGS, UT 84045

BANK OF UTAH
2605 WASHINGTON BLVD
OGDEN, UT 84401

C & S LEE PROPERTIES LLC
3219 LAURELWOOD DR
TWIN FALLS, ID 83301

SORENSEN INVESTMENT
3316 W 4305 S
WEST VALLEY CITY, UT 84119

CONNOR G LLC
3377 N COTTONWOOD LN
PROVO, UT 84604

DDO-UTAH LLC
3845 STOCKTON HILLS RD
KINGMAN, AZ 86409

ANDERSON, WHITNEY
3877 EASTWOOD LN
SALT LAKE CITY, UT 84109

SYCAMORE FAMILY LLC
4302 SHEFFIELD DR
PROVO, UT 84604

UTAH STATE ROAD COMMISSION
%DIVISION OF PROPERTY MANAGEMENT
4501 S 2700 W
SALT LAKE CITY, UT 84119

WELLEN, STEPHEN R & SANDRA P
4604 CEDAR OAKS LA
BELLAIRE, TX 77401

STRATTON, CONNIE
5099 RIVERPARK WY
PROVO, UT 84604

WILLARDSON, CRAIG A & JOAN ELIZABETH (ET AL)
5220 AVENIDA DE DESPACIO
YORBA LINDA, CA 92686

TOP PROPERTY MANAGEMENT LLC
%CHRISTENSEN, LESLIE
10136 MYSTIC DR
AMERICAN FORK, UT 84003

TOP PROPERTY MANAGEMENT LLC
10136 N MYSTIC DR
HIGHLAND, UT 84003

TITTENSOR, ZACHARY S & JENNIFER
12527 N WILDFLOWER LA
AMERICAN FORK, UT 84003

NIELSEN, J CARY & ALLISON B
21211 SILENT SPRING LA
TRABUCO CANYON, CA 92679

HOYT DENTAL 401(K) PROFIT SHARING PLAN
40119 MURRIETA HOT SPRINGS RD
C105
MURRIETA, CA 92563

HOYT, LARRY & SUZANN
40579 EYOTA CT
MURRIETA, CA 92562

NEIGHBORHOOD MEETING
Keller Williams Westfield

841 N. 900 W.
Orem, UT 84057
December 10th, 2015 6:30-7:00

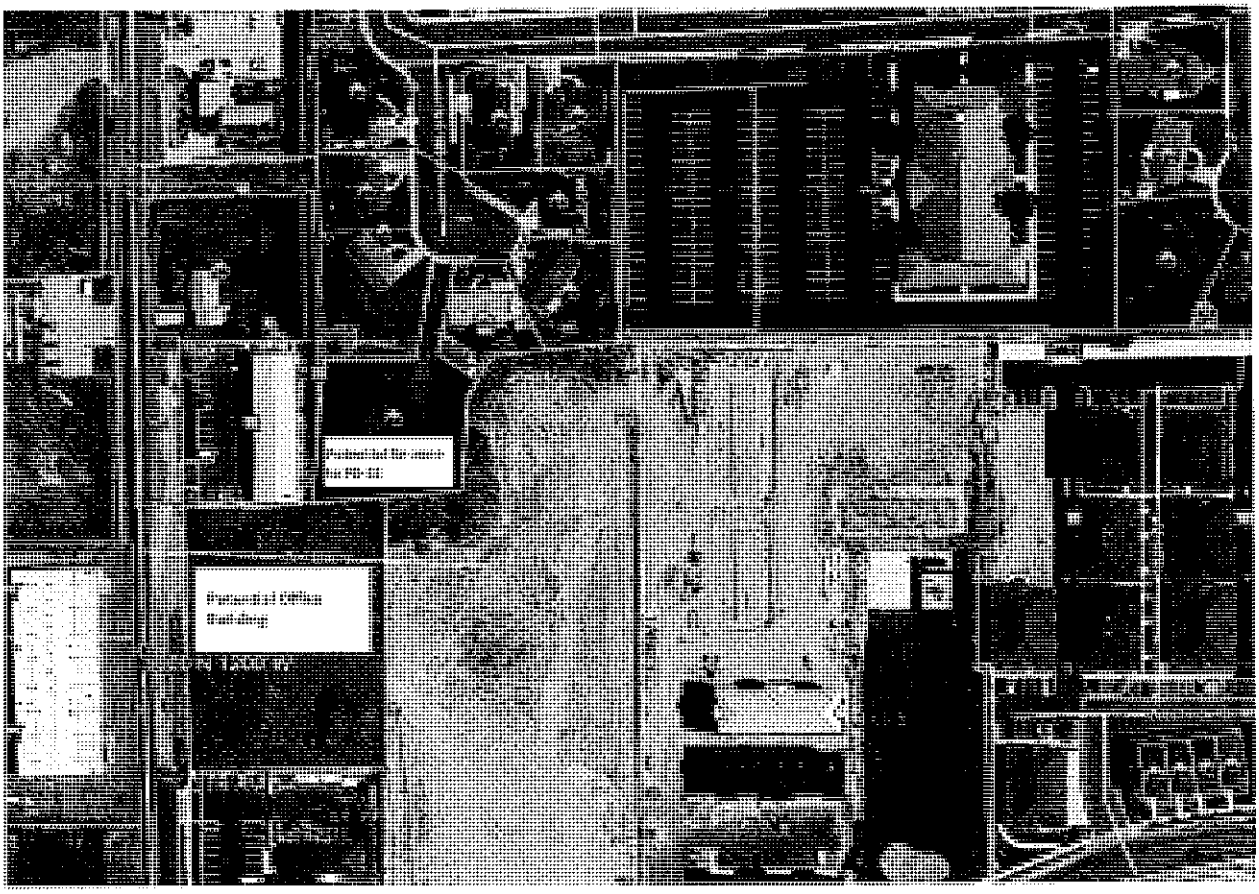
Boyd Brown intends to submit an application to build a professional office building at 1000 N. 1200 West. Part of this application will be applying for rezone of the Blue parcel below to PD-22 Zone to become consistent with the adjacent Northgate Village project. We are holding a neighborhood meeting prior to submitting our full application to the city. It will be an open house format, you can arrive anywhere between 6:30-7 to address any questions or concerns. The developers will present plans and be prepared to receive input at the meeting. Please plan to attend. If you cannot attend the meeting please call or email:

Shad Selmos: 801-326-8938 | shadselmos@kw.com
Boyd Brown: 801-326-8886

"Pursuant to Orem City Code Section 22-1-5(F), this meeting is being held to discuss the project with you. This is an opportunity for you to review the plans and provide input and recommendations regarding the project. This application has not yet been reviewed by the City and is subject to change during the review process."

We look forward to meeting with you and your neighbors.

RECEIVED
12/1/15



1000 N. 1200 W.
Orem, UT 84057

Revised Zoning Change Request

NEIGHBORHOOD MEETING
Keller Williams Westfield

841 N. 900 W.
Orem, UT 84057
February 11th, 2016

Boyd Brown had made revisions to the previous intended re zone at 1000 North 1200 West. **Our goal is to build a 2 story office building on 1200 West.** We are required to hold another neighborhood meeting to discuss the proposed change. It will be an open house format, you can arrive anywhere between 5:00-6:00 to address any questions or concerns. The developers will present plans and be prepared to receive input at the meeting. Please plan to attend. If you cannot attend the meeting please call or email:

Shad Selmos: 801-326-8938 | shadselmos@kw.com
Boyd Brown: 801-326-8886

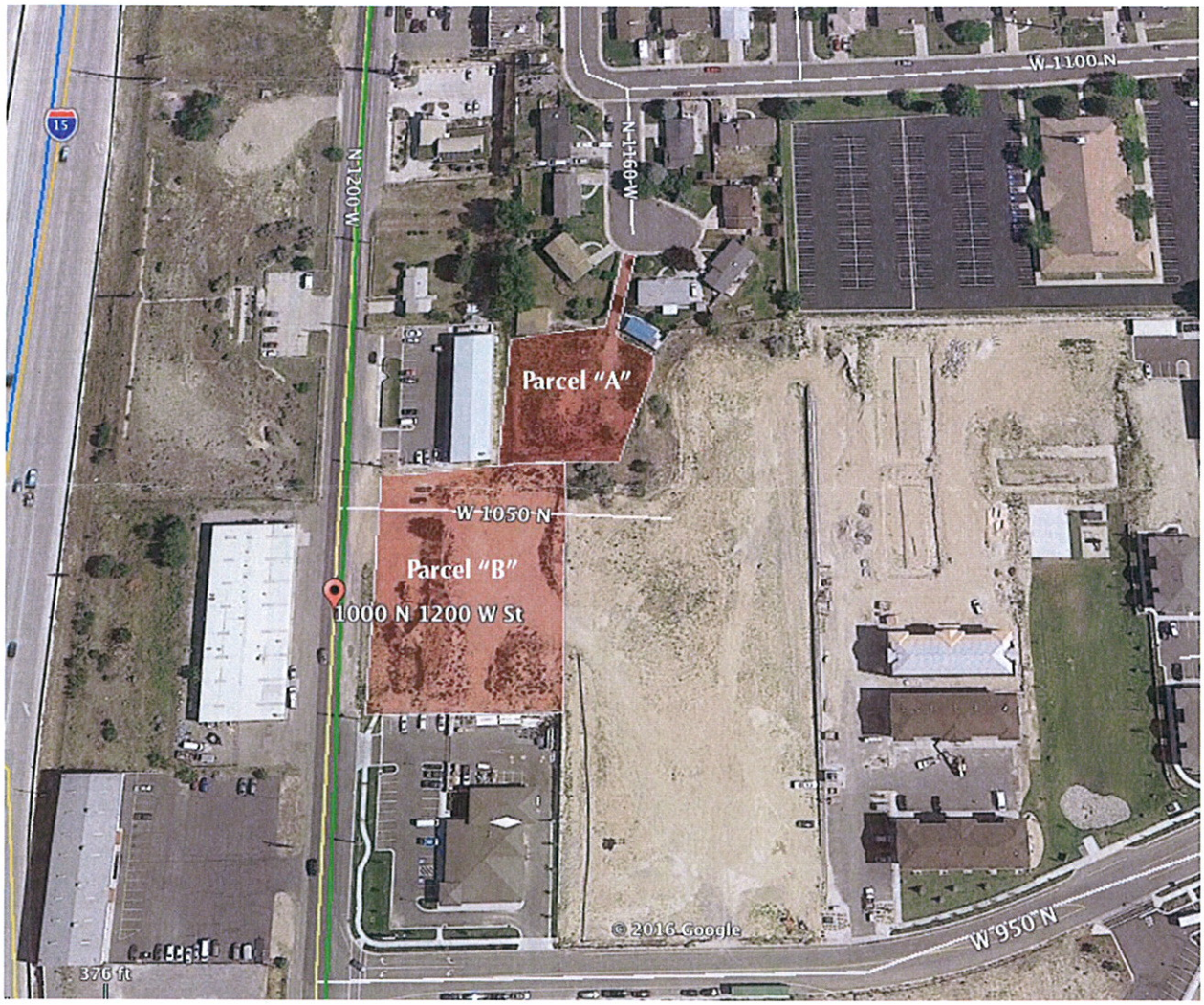
Four Actions have been applied for in relation to this application:

1. Re-zone parcel A from residential to HS (Highway Services)
2. Re-zone parcel B from PD-22 to HS.
3. Remove parcel B from the PD-22 and its related appendix's related to it within the City's Ordinance.
4. General plan will be amended for parcel "A" from LDR (Low Density Residential) to CC (Community Commercial).

"Pursuant to Orem City Code Section 22-1-5(F), this meeting is being held to discuss the project with you. This is an opportunity for you to review the plans and provide input and recommendations regarding the project. This application has not yet been reviewed by the City and is subject to change during the review process."

We look forward to meeting with you and your neighbors.

RECEIVED 2/6/16



1000 N. 1200 W.
Orem, UT 84057

NORTHGATE VILLAGE
DEVELOPMENT LC
PO BOX 1234
OREM, UT 84059

NORTHGATE VILLAGE
DEVELOPMENT LC
PO BOX 1239
OREM, UT 84059

NORTHGATE HOTEL LLC
%URRUTIA, SHARON
PO BOX 1327
EAGLE, ID 83616

ZEBRA ASSET MANAGEMENT LLC
PO BOX 1481
OREM, UT 84059

UTAH DEPARTMENT OF
TRANSPORTATION
PO BOX 148420
SALT LAKE CITY, UT 84114

FORSMAN, DANIEL B & TRUDY H
PO BOX 1715
PROVO, UT 84603

MC DONALD'S REAL ESTATE
COMPANY
PO BOX 182571
COLUMBUS, OH 43218

SILVER CREEK PRODUCE LLC
PO BOX 51998
IDAHO FALLS, ID 83405

WINCO FOODS LLC
%TAX DEPARTMENT
PO BOX 5756
BOISE, ID 83705

DAVENPORT, THOMAS N
PO BOX 754
PROVO, UT 84603

HART, ROLAND J
20 TIMBERLINE TRL
LANDER, WY 82520

TLB2 LLC
51 W CENTER # 420
OREM, UT 84057

TLB2 LLC
51 W CENTER ST # 420
OREM, UT 84057

KRISTIE SNYDER
56 N STATE STREET
OREM, UT 84057

FONSECA, WALSTIR H
76 S KINGS PEAK DR
LINDON, UT 84042

CRAWFORD, GARY L & KATHRYN A
79 N PALISADES DR
OREM, UT 84097

COMMON AREA
100 E CENTER ST
PROVO, UT 84606

WILLIAMSON RENTALS LC
168 N 1200 E
OREM, UT 84097

WASHBURN, PAUL V & STEFFANI
172 S 165 W
OREM, UT 84057

WASHBURN, PAUL V & STEFFANI Y
(ET AL)
172 S 165 W
OREM, UT 84058

SMITH, ERIC C & BONNIE L
184 E 1460 N
OREM, UT 84057

WRIGHT, RODNEY K & LINDA F
191 SHADOW BREEZE RD
KAYSVILLE, UT 84037

WILLIAMSON RENTALS LC
195 S GENEVA RD
LINDON, UT 84042

SANFORD, BRIAN
197 COURTNEY ANN DR
HENDERSON, NV 89074

HANSEN GROUP THE LC (ET AL)
201 W 3200 N
PROVO, UT 84604

NIEDENS BROADWATER LLC
214 SILVER CLOUD CIR
BOZEMAN, MT 59715

SOELBERG PROPERTIES INC
248 MOUNTAIN WAY DR
OREM, UT 84058

WILLIAMSON, TYSON D & AUDRA
MAY
292 N 860 E
AMERICAN FORK, UT 84003

BELKIN, MATTHEW W
342 W 200 S APT 201
SALT LAKE CITY, UT 84101

CARSON, MICHAEL H
367 N STATE ST
OREM, UT 84057

SUITE PROPERTIES LC
%DASTRUP, MERRILL
368 S 850 W
OREM, UT 84058

GERULAT, NICOLE C
375 HAMPTON AV
SALT LAKE CITY, UT 84111

WHITTAKER INVESTMENTS LLC
415 W 750 S
OREM, UT 84058

GALLAND, GARY & DEVON
432 SHEFFIELD DR
PROVO, UT 84604

GALLAND, GARY
432 W SHEFFIELD DR
PROVO, UT 84606

SUELDO, JORGE
446 W 165 S
OREM, UT 84058

WILLIAMSON, JERRY D & JOAN H (ET AL)
455 E 1600 S
OREM, UT 84097

JEEMA V LLC
470 S 200 W
SALEM, UT 84653

MANN, CHRISTOPHER & ASHLIE
470 W 750 S
OREM, UT 84058

NORTHGATE VILLAGE DEVELOPMENT LC
507 N 1500 W
OREM, UT 84057

RIRIE PROPERTIES LLC
518 N 1980 E
SPANISH FORK, UT 84660

POULSEN, DANIEL
566 S 1600 W
PROVO, UT 84601

MURILLO, JARED M & ALEX
575 N 1200 W
OREM, UT 84057

CROOK, JORDAN TAYLOR & KENNETH L (ET AL)
650 E CENTER ST
ALPINE, UT 84004

CAMERON, BRUCE & MARCIA
658 N BELLA VISTA DR
OREM, UT 84097

BRIAN & LISA KELLY
TIMPVIEW NEIGHBORHOOD CHAIR
668 W 1325 NORTH
OREM, UT

CHRISTENSEN, GORDON J & RELLA P
675 E 900 S
MAPLETON, UT 84664

LEE, MICHAEL VALLANT & JULIE A
714 W 550 S
OREM, UT 84058

CRITCHFIELD, C JAY & LOIS J
725 S 200 W
OREM, UT 84058

CLYDE HOPEFULL LLC
730 N 1500 W
OREM, UT 84057

CRUMP PROPERTY LLC
811 N 900 W
OREM, UT 84057

SUMTAY PROPERTIES #2 LLC
813 N 900 W
OREM, UT 84058

NELSON ENTERPRISES LLC
--OR CURRENT RESIDENT--
816 N 980 WEST
OREM, UT 84057

WASHBURN, PAUL V & STEFFANI
--OR CURRENT RESIDENT--
817 N 900 WEST
OREM, UT 84057

KCM HOLDINGS LLC
--OR CURRENT RESIDENT--
819 N 900 WEST
OREM, UT 84057

EXCEL PROPERTIES OREM LLC
820 N 980 W
OREM, UT 84057

WASHBURN, PAUL V (ET AL)
825 N 900 W
OREM, UT 84057

WASHBURN, PAUL V (ET AL)
830 N 980 W
OREM, UT 84057

NIEDENS BROADWATER LLC
--OR CURRENT RESIDENT--
833 N 900 WEST
OREM, UT 84057

MAVERIK INC
--OR CURRENT RESIDENT--
833 N 1200 WEST
OREM, UT 84057

WASHBURN, PAUL V (ET AL)
--OR CURRENT RESIDENT--
840 N 980 WEST
OREM, UT 84057

RENAISSANCE WATERBEDS AND FUNITURE OF LINDON INC
--OR CURRENT RESIDENT--
841 N 900 WEST
OREM, UT 84057

CENTER RIDGE PROPERTY MANAGEMENT LLC
--OR CURRENT RESIDENT--
848 N 980 WEST
OREM, UT 84057

LEE, MICHAEL VALLANT & JULIE A
--OR CURRENT RESIDENT--
851 N 900 WEST
OREM, UT 84057

RIRIE PROPERTIES LLC
--OR CURRENT RESIDENT--
859 N 900 WEST
OREM, UT 84057

TLB2 LLC
--OR CURRENT RESIDENT--
860 N 980 WEST
OREM, UT 84057

CRITCHFIELD, C JAY & LOIS J
--OR CURRENT RESIDENT--
864 N 980 WEST
OREM, UT 84057

JACKMAN, FREDERICK A & FREDERICK V (ET AL)
867 N 900 W # 307
OREM, UT 84057

JACKMAN, FREDERICK A & FREDERICK V (ET AL)
--OR CURRENT RESIDENT--
867 N 900 WEST
OREM, UT 84057

TLB2 LLC
--OR CURRENT RESIDENT--
870 N 980 WEST
OREM, UT 84057

NORTHGATE HOTEL LLC
--OR CURRENT RESIDENT--
873 N 1200 WEST
OREM, UT 84057

MAVERIK INC
%MURRAY, DAN
880 W CENTER ST
NORTH SALT LAKE, UT 84054

SPERRY, ROBERT LYMAN
881 N 900 W
OREM, UT 84057

JACKMAN, FREDERICK A
883 N 900 W
OREM, UT 84057

EDGAR, SAMUEL & ERIN
887 N 900 W
OREM, UT 84057

CHRISTENSEN, GORDON J & RELLA P
--OR CURRENT RESIDENT--
891 N 900 WEST
OREM, UT 84057

OPENSHAW, ROBYN
893 N 900 W
OREM, UT 84057

GODFREY, NADENE
894 N 960 W
OREM, UT 84057

GODFREY, NADENE
--OR CURRENT RESIDENT--
894 N 980 WEST
OREM, UT 84057

SANFORD, BRIAN
--OR CURRENT RESIDENT--
895 N 920 WEST
OREM, UT 84057

WINCO FOODS LLC
--OR CURRENT RESIDENT--
895 N 980 WEST
OREM, UT 84057

CONNOR G LLC
--OR CURRENT RESIDENT--
896 N 940 WEST
OREM, UT 84057

CHILD, BENJAMIN D
897 N 900 W
OREM, UT 84057

HABIBULLAH, SALMAN R (ET AL)
898 N 980 W
OREM, UT 84057

MYHRE HOLDINGS-OREM LLC
--OR CURRENT RESIDENT--
898 N 1200 WEST
OREM, UT 84057

HOYT, LARRY & SUZANN
--OR CURRENT RESIDENT--
899 N 920 WEST
OREM, UT 84057

MAYOR RICHARD F. BRUNST, JR.
900 E HIGH COUNTRY DRIVE
OREM, UT 84097-2389

NEILSON, ROBERT T & SARAH ELIZABETH WHEATLEY
902 N 940 W
OREM, UT 84057

GALLAND, GARY & DEVON
--OR CURRENT RESIDENT--
904 N 960 WEST
OREM, UT 84057

GERULAT, NICOLE C
--OR CURRENT RESIDENT--
905 N 920 WEST
OREM, UT 84057

MURILLO, JARED M & ALEX
--OR CURRENT RESIDENT--
906 N 980 WEST
OREM, UT 84057

STRATTON, CONNIE
--OR CURRENT RESIDENT--
907 N 900 WEST
OREM, UT 84057

LEE, CHRISTOPHER C & ANDREA D
908 N 940 W
OREM, UT 84057

WATTS, EMMELINE
909 N 940 W
OREM, UT 84057

LULLOFF, JANEAN & BRIAN
910 N 960 W
OREM, UT 84057

BARRY, DEAN & JENNIFER L
912 N 980 W
OREM, UT 84057

GOULDING, DARETH & JESSE
913 N 920 W
OREM, UT 84057

WHEELER, MICHAEL
914 N 940 W
OREM, UT 84057

BLEAK, NATHAN & STEPHANIE
--OR CURRENT RESIDENT--
915 N 940 WEST
OREM, UT 84057

GATES, JAY C
916 N 960 W
OREM, UT 84057

HOYT, RYAN L & CARINA S
918 N 960 W
OREM, UT 84057

PRATT, STEPHEN W & CAMMIE
920 N 960 W
OREM, UT 84057

BLEAK, BRYAN JAMES & JENNIE
921 N 940 W
OREM, UT 84057

GALLAND, GARY
923 N 920 W
OREM, UT 84057

MC CANN, DARIN R
923 W 965 N
OREM, UT 84057

FAERBER, ALMA
924 N 980 W
OREM, UT 84057

IAM, ADHIS
925 N 900 W
OREM, UT 84057

CRAWFORD, GARY L & KATHRYN A
--OR CURRENT RESIDENT--
926 N 940 WEST
OREM, UT 84057

HART, ROLAND J
--OR CURRENT RESIDENT--
926 W 880 NORTH
OREM, UT 84057

YOUNGQUIST, AMBER
927 N 940 W
OREM, UT 84057

WRIGHT, RODNEY K & LINDA F
--OR CURRENT RESIDENT--
927 W 965 NORTH
OREM, UT 84057

SYCAMORE FAMILY LLC
928 N 960 W
OREM, UT 84057

FASLIJA, CAROL Y
928 W 880 N
OREM, UT 84057

BELKIN, MATTHEW W
--OR CURRENT RESIDENT--
929 N 900 WEST
OREM, UT 84057

GALLAND, GARY
--OR CURRENT RESIDENT--
930 W 880 NORTH
OREM, UT 84057

ECKLES, MARIE P
--OR CURRENT RESIDENT--
931 W 965 NORTH
OREM, UT 84057

ECKLES, MARIE P
931 W 965 N
OREM, UT 84058

ARNOLD, GARY
932 N 940 W
OREM, UT 84057

CAMERON, MICHAEL C
932 W 880 N
OREM, UT 84057

TITTENSOR, ZACHARY S & JENNIFER
--OR CURRENT RESIDENT--
933 N 900 WEST
OREM, UT 84057

SYCAMORE FAMILY LLC
--OR CURRENT RESIDENT--
934 N 980 WEST
OREM, UT 84057

BAMBL, MATT
934 W 880 N
OREM, UT 84057

WOOD, GORDON S & TIFFANY H (ET AL)
935 W 965 N
OREM, UT 84057

AMADOR, MICHELLE
937 N 940 W
OREM, UT 84057

CARSON, MICHAEL H
--OR CURRENT RESIDENT--
938 N 940 WEST
OREM, UT 84057

JUDKINS, DARRELL WAYNE & SHERRI
938 N 960 W
OREM, UT 84057

SUITE PROPERTIES LC
--OR CURRENT RESIDENT--
938 N 980 WEST
OREM, UT 84057

WOOD, KARI M
939 N 900 W
OREM, UT 84057

ELDER, GEOFFREY SCOTT & STACY M
939 W 965 N
OREM, UT 84057

AHN, SOO YOUNG
%ALEXANDER, SOO YOUNG AHN
941 N 940 W
OREM, UT 84057

GRAVES, HOPE
942 N 940 W
OREM, UT 84057

JONES, CHARLES R & ATHENA ANN
943 N 900 W
OREM, UT 84057

HOYT, CHARLES LAURENCE & SUZANN
943 W 965 N
OREM, UT 84057

MC CANN, DANIEL MARCUS REESE & JESSICA A
--OR CURRENT RESIDENT--
944 N 980 WEST
OREM, UT 84057

HERINGER SALES AND SERVICE INC
--OR CURRENT RESIDENT--
944 N 1200 WEST
OREM, UT 84057

MANN, CHRISTOPHER & ASHLIE
--OR CURRENT RESIDENT--
944 W 880 NORTH
OREM, UT 84057

VANEE' BURGESS ASHBY LLC
945 N 920 W
OREM, UT 84057

PHILLIPS, ANDREA
945 N 940 W
OREM, UT 84057

YU, LINA (ET AL)
946 N 940 W
OREM, UT 84057

HART, JOSH STEVEN & ANGELA
946 W 880 N
OREM, UT 84057

STOLZE, MICHAEL R & KATHY V (ET AL)
947 N 900 W
OREM, UT 84057

SCHNEIDER, GLEN L
948 W 880 N
OREM, UT 84057

KERSHAW, LYNN G & SUSAN J
949 N 920 W
OREM, UT 84057

ARGAEZ, HUMBERTO & PRISCILA
949 N 940 W
OREM, UT 84057

HOYT DENTAL 401(K) PROFIT SHARING PLAN
--OR CURRENT RESIDENT--
949 W 965 NORTH
OREM, UT 84057

WHITTAKER INVESTMENTS LLC
--OR CURRENT RESIDENT--
950 N 940 WEST
OREM, UT 84057

SPERRY, MICHAEL GORDON
950 W 880 N
OREM, UT 84057

TIPPETS, LEWIS R & KAREN A
951 N 900 W
OREM, UT 84057

CROOK, JORDAN TAYLOR & KENNETH L (ET AL)
--OR CURRENT RESIDENT--
953 N 920 WEST
OREM, UT 84057

WILLIAMSON, TYSON D & AUDRA MAY
--OR CURRENT RESIDENT--
953 W 965 NORTH
OREM, UT 84057

REDD, JEANNE H
954 N 940 W
OREM, UT 84057

WELLEN, STEPHEN R & SANDRA P
--OR CURRENT RESIDENT--
955 N 900 WEST
OREM, UT 84057

THRUSTON, HOWARD II (ET AL)
957 N 920 W
OREM, UT 84057

ZHANG, XINYOU (ET AL)
957 W 965 N
OREM, UT 84057

ENGLE, KOZETTE
958 N 940 W
OREM, UT 84057

KENDALL, KIMBERLEE ELIZABETH
& KIMBERLEE ELIZABETH
958 W 880 N
OREM, UT 84057

GALLAND, MASON S & ALYXANDRA
K
961 N 920 W
OREM, UT 84057

TAYLOR, ROGAN L
962 W 880 N
OREM, UT 84057

MOULTON, MICHAEL B
963 N 900 W
OREM, UT 84057

CAMERON, BRUCE & MARCIA
--OR CURRENT RESIDENT--
966 W 880 NORTH
OREM, UT 84057

PHILLIPS, TERESA A
969 N 920 W
OREM, UT 84057

CLYDE, TYLER & LAUREN
--OR CURRENT RESIDENT--
970 W 880 NORTH
OREM, UT 84057

HALES, JANET F
971 N 900 W
OREM, UT 84057

GIBBS, GAYE
973 N 920 W
OREM, UT 84057

COOPER, CINDY D
975 N 900 W
OREM, UT 84057

NIELSEN, J CARY & ALLISON B
--OR CURRENT RESIDENT--
977 N 920 WEST
OREM, UT 84057

ZEBRA ASSET MANAGEMENT LLC
--OR CURRENT RESIDENT--
979 N 900 WEST
OREM, UT 84057

HANSEN GROUP THE LC (ET AL)
--OR CURRENT RESIDENT--
980 W 960 NORTH
OREM, UT 84057

PALICA, TRACY
--OR CURRENT RESIDENT--
983 N 900 WEST
OREM, UT 84057

WILLIAMS, KEVIN J & BONNIE
983 N 920 WEST 71
OREM, UT 84057

WILLIAMS, KEVIN J & BONNIE
--OR CURRENT RESIDENT--
983 N 920 WEST
OREM, UT 84057

HAINSWORTH, JASON E (ET AL)
983 W 1055 N # 809
OREM, UT 84057

HARRISON, CURTIS J & KAILEY A (ET
AL)
983 W 1055 N # 814
OREM, UT 84057

COX, STEPHANIE J
983 W 1055 N # 805
OREM, UT 84057

HANSEN, CHRISTOPHER G & REBECA
A
983 W 1055 N # 807
OREM, UT 84057

AVILES, CIRENIA
983 W 1055 N # 808
OREM, UT 84057

BUCHANAN, KAYLE K & CANDICE O
983 W 1055 N # 803
OREM, UT 84057

FREESTONE, JENNI
983 W 1055 N # 802
OREM, UT 84057

WILLARDSON, CRAIG A & JOAN
ELIZABETH (ET AL)
--OR CURRENT RESIDENT--
983 W 1055 NORTH UNIT#801
OREM, UT 84057

FREESTONE, JENNI
--OR CURRENT RESIDENT--
983 W 1055 NORTH UNIT#802
OREM, UT 84057

BUCHANAN, KAYLE K & CANDICE O
--OR CURRENT RESIDENT--
983 W 1055 NORTH UNIT#803
OREM, UT 84057

WILLIAMSON RENTALS LC
--OR CURRENT RESIDENT--
983 W 1055 NORTH UNIT#804
OREM, UT 84057

COX, STEPHANIE J
--OR CURRENT RESIDENT--
983 W 1055 NORTH UNIT#805
OREM, UT 84057

DAVENPORT, THOMAS N
--OR CURRENT RESIDENT--
983 W 1055 NORTH UNIT#806
OREM, UT 84057

HANSEN, CHRISTOPHER G & REBECA A
--OR CURRENT RESIDENT--
983 W 1055 NORTH UNIT#807
OREM, UT 84057

AVILES, CIRENIA
--OR CURRENT RESIDENT--
983 W 1055 NORTH UNIT#808
OREM, UT 84057

HAINSWORTH, JASON E (ET AL)
--OR CURRENT RESIDENT--
983 W 1055 NORTH UNIT#809
OREM, UT 84057

THORESEN, STEPHEN L & MARY ANN
--OR CURRENT RESIDENT--
983 W 1055 NORTH UNIT#810
OREM, UT 84057

BREMS, KENYON P & SHAYLI M
--OR CURRENT RESIDENT--
983 W 1055 NORTH UNIT#811
OREM, UT 84057

TOP PROPERTY MANAGEMENT LLC
--OR CURRENT RESIDENT--
983 W 1055 NORTH UNIT#812
OREM, UT 84057

MALLORY, KEVIN G
--OR CURRENT RESIDENT--
983 W 1055 NORTH UNIT#813
OREM, UT 84057

HARRISON, CURTIS J & KAILEY A (ET AL)
--OR CURRENT RESIDENT--
983 W 1055 NORTH UNIT#814
OREM, UT 84057

ANDERSON, WHITNEY
--OR CURRENT RESIDENT--
983 W 1055 NORTH UNIT#815
OREM, UT 84057

SPROAT, ETHAN M & LIBERTY P
--OR CURRENT RESIDENT--
986 W 950 NORTH
OREM, UT 84057

SPROAT, ETHAN M & LIBERTY P
986 W 960 N
OREM, UT 84097

988 PROPERTIES LLC
--OR CURRENT RESIDENT--
988 W 950 NORTH
OREM, UT 84057

NEVES, JEREMY D
989 N 900 W
OREM, UT 84057

WILLIAMSON, JERRY D & JOAN H (ET AL)
--OR CURRENT RESIDENT--
992 W 950 NORTH
OREM, UT 84057

GRAY, JORDAN L
993 N 900 W
OREM, UT 84057

LYMAN, DAVID SHAY
996 W 950 N
OREM, UT 84057

C & S LEE PROPERTIES LLC
--OR CURRENT RESIDENT--
998 W 950 NORTH
OREM, UT 84057

BANK OF UTAH
--OR CURRENT RESIDENT--
1000 W 800 NORTH
OREM, UT 84057

PAYNE, SHAWN D & TONYA M
1004 W 950 N
OREM, UT 84057

WILLIAMSON, MARCUS C
1012 W 950 N
OREM, UT 84057

CLYDE, TYLER & LAUREN
1014 S 300 W
LEHI, UT 84043

HALL, ROBERT JEFFREY & KATHERINE
1016 W 950 N
OREM, UT 84057

ADAMS, NICHOLAS M & ALISHA
1018 W 950 N
OREM, UT 84057

DUNN, CARRIE
1023 N 900 W
OREM, UT 84057

WILLIAMSON RENTALS LC
--OR CURRENT RESIDENT--
1025 N 920 WEST UNIT# 1016
OREM, UT 84057

CUSICK, CRAIG & SADIE
1030 N 995 W # 906
OREM, UT 84057

FISHER, CHASE & TIFFANI
1030 N 995 W # 909
OREM, UT 84057

BOSHARD, DEVRAUX R
1030 N 995 W # 915
OREM, UT 84057

MERO, NEVRUS & ENGJELLUSHE
1030 N 995 W
OREM, UT 84057

STEWART, KENNETH S & DEBORAH K
1030 N 995 W # 903
OREM, UT 84057

WOLSEY, ELIZABETH A
1030 N 995 W # 905
OREM, UT 84057

HILL, CLAUDIA A
1030 N 995 W # 913
OREM, UT 84057

SELK, LOGAN A
1030 N 995 W # 907
OREM, UT 84057

MURILLO, JOSHUA A & JARED
1030 N 995 W # 908
OREM, UT 84057

BIRD, KIMBERLY A
1030 N 995 W # 911
OREM, UT 84057

WEBB, NATALIE
1030 N 995 W # 912
OREM, UT 84057

JEEMA V LLC
--OR CURRENT RESIDENT--
1030 N 995 WEST UNIT#901
OREM, UT 84057

MERO, NEVRUS & ENGJELLUSHE
--OR CURRENT RESIDENT--
1030 N 995 WEST UNIT#902
OREM, UT 84057

STEWART, KENNETH S & DEBORAH K
--OR CURRENT RESIDENT--
1030 N 995 WEST UNIT#903
OREM, UT 84057

WOLSEY, ELIZABETH A
--OR CURRENT RESIDENT--
1030 N 995 WEST UNIT#905
OREM, UT 84057

CUSICK, CRAIG & SADIE
--OR CURRENT RESIDENT--
1030 N 995 WEST UNIT#906
OREM, UT 84057

SELK, LOGAN A
--OR CURRENT RESIDENT--
1030 N 995 WEST UNIT#907
OREM, UT 84057

MURILLO, JOSHUA A & JARED
--OR CURRENT RESIDENT--
1030 N 995 WEST UNIT#908
OREM, UT 84057

FISHER, CHASE & TIFFANI
--OR CURRENT RESIDENT--
1030 N 995 WEST UNIT#909
OREM, UT 84057

TOP PROPERTY MANAGEMENT LLC
--OR CURRENT RESIDENT--
1030 N 995 WEST UNIT#910
OREM, UT 84057

BIRD, KIMBERLY A
--OR CURRENT RESIDENT--
1030 N 995 WEST UNIT#911
OREM, UT 84057

WEBB, NATALIE
--OR CURRENT RESIDENT--
1030 N 995 WEST UNIT#912
OREM, UT 84057

HILL, CLAUDIA A
--OR CURRENT RESIDENT--
1030 N 995 WEST UNIT#913
OREM, UT 84057

WATTS, ELIZABETH
--OR CURRENT RESIDENT--
1030 N 995 WEST UNIT#914
OREM, UT 84057

BOSHARD, DEVRAUX R
--OR CURRENT RESIDENT--
1030 N 995 WEST UNIT#915
OREM, UT 84057

FONSECA, WALSTIR H
--OR CURRENT RESIDENT--
1030 N 995 WEST UNIT#916
OREM, UT 84057

LAMOREAUX, THOMAS C
1052 GRAND CIR
PROVO, UT 84604

988 PROPERTIES LLC
1058 N 500 W
OREM, UT 84057

JACKMAN, TRAVIS S & JENNALEE R
1079 W 965 N # 110
OREM, UT 84057

CUTLER, PRESTON (ET AL)
1079 W 965 N # 401
OREM, UT 84057

MILLS, KELSEY RAE
1079 W 965 N # 404
OREM, UT 84057

GAMMELL, BRANDI
1079 W 965 N # 201
OREM, UT 84057

SMITH, SEAN & MORGAN
1079 W 965 N # 302
OREM, UT 84057

BACCUS, LINDSAY
1079 W 965 N # 402
OREM, UT 84057

DE LA CRUZ, GLORIA
1079 W 965 N # 303
OREM, UT 84057

GARRARD, JENNIFER ANN
1079 W 965 N # 403
OREM, UT 84057

LESTARI, FARLEY
1079 W 965 N # 103
OREM, UT 84057

MORLEY, RYAN
1079 W 965 N # 301
OREM, UT 84057

FRY, PETER M
1079 W 965 N # 304
OREM, UT 84058

JARROW, ZACHARY O & YOANI
1080 W 965 N # 104
OREM, UT 84057

SHAW, TYLER J & KYLEE
1080 W 965 N # 205
OREM, UT 84057

SCHROEPPEL, ASHLEE A
1080 W 965 N UNIT 305
OREM, UT 84057

DAVIDSON, JOAN H
1080 W 965 N # 102
OREM, UT 84057

MOORE, SARA L
1080 W 965 N # 204
OREM, UT 84057

BLACKETT, CODY T & ALICIA A
1080 W 965 N # 405
OREM, UT 84057

SORENSEN INVESTMENT
--OR CURRENT RESIDENT--
1100 W 800 NORTH
OREM, UT 84057

DDO-UTAH LLC
--OR CURRENT RESIDENT--
1130 W 800 NORTH
OREM, UT 84057

800 NORTH RETAIL LLC
--OR CURRENT RESIDENT--
1160 W 800 NORTH
OREM, UT 84057

MC DONALD'S REAL ESTATE COMPANY
--OR CURRENT RESIDENT--
1180 W 800 NORTH
OREM, UT 84057

PALICA, TRACY
1229 S 1100 E
OREM, UT 84097

THORESEN, STEPHEN L & MARY ANN
1264 E 530 N
OREM, UT 84097

BLEAK, NATHAN & STEPHANIE
1286 W 1980 N
PROVO, UT 84604

BETHERS, LARRY & VERNETTA
1370 W 1460 N
PROVO, UT 84604

KCM HOLDINGS LLC
%MAUGHAN, KENNTHE
1406 NARRA PL
PLEASANT GROVE, UT 84062

CALDWELL, BRADLEY R & REBECCA L
1445 S 100 W
OREM, UT 84058

NELSON ENTERPRISES LLC
1629 VIA MONTEMAR
PALOS VERDES ESTATES, CA 90274

MC CANN, DANIEL MARCUS REESE & JESSICA A
1714 N 850 W
OREM, UT 84057

RENAISSANCE WATERBEDS AND FUNITURE OF LINDON INC
1755 BLUEBIRD RD
OREM, UT 84097

MALLORY, KEVIN G
1787 W 410 N
LINDON, UT 84042

800 NORTH RETAIL LLC
1820 S ESCONDIDO BLVD STE 205
ESCONDIDO, CA 92025

JASON BENCH
1911 N MAIN STREET
OREM, UT 84057-2101

CENTER RIDGE PROPERTY
MANAGEMENT LLC
1912 W 930 N
PLEASANT GROVE, UT 84062

EB WEBB LLC
2150 N CENTER ST
LEHI, UT 84043

BREMS, KENYON P & SHAYLI M
2494 APRICOT PL
SARATOGA SPRINGS, UT 84045

BANK OF UTAH
2605 WASHINGTON BLVD
OGDEN, UT 84401

WATTS, ELIZABETH
3137 E SAN ANGELO AV
GILBERT, AZ 85234

C & S LEE PROPERTIES LLC
3219 LAURELWOOD DR
TWIN FALLS, ID 83301

SORENSEN INVESTMENT
3316 W 4305 S
WEST VALLEY CITY, UT 84119

CONNOR G LLC
3377 N COTTONWOOD LN
PROVO, UT 84604

HERINGER SALES AND SERVICE INC
3598 N 1450 W
PLEASANT GROVE, UT 84062

DDO-UTAH LLC
3845 STOCKTON HILLS RD
KINGMAN, AZ 86409

ANDERSON, WHITNEY
3877 EASTWOOD LN
SALT LAKE CITY, UT 84109

SYCAMORE FAMILY LLC
4302 SHEFFIELD DR
PROVO, UT 84604

UTAH DEPARTMENT OF
TRANSPORTATION
4501 S 2700 W
SALT LAKE CITY, UT 84119

WELLEN, STEPHEN R & SANDRA P
4604 CEDAR OAKS LA
BELLAIRE, TX 77401

STRATTON, CONNIE
5099 RIVERPARK WY
PROVO, UT 84604

WILLARDSON, CRAIG A & JOAN
ELIZABETH (ET AL)
5220 AVENIDA DE DESPACIO
YORBA LINDA, CA 92686

MAYO, DAVID (ET AL)
6630 CASTLE DR
BLOOMFIELD HILLS, MI 48301

MYHRE HOLDINGS-OREM LLC
8089 GLOBE DR
WOODBURY, MN 55125

TOP PROPERTY MANAGEMENT LLC
%CHRISTENSEN, LESLIE
10136 MYSTIC DR
AMERICAN FORK, UT 84003

TOP PROPERTY MANAGEMENT LLC
%CHRISTENSEN, LESLIE
10136 MYSTIC DR
HIGHLAND, UT 84003

POZO, GABY & MICHAEL ERIK
12523 VARENNA ST
HERRIMAN, UT 84096

TITTENSOR, ZACHARY S & JENNIFER
12527 N WILDFLOWER LA
AMERICAN FORK, UT 84003

NIELSEN, J CARY & ALLISON B
21211 SILENT SPRING LA
TRABUCO CANYON, CA 92679

HOYT DENTAL 401(K) PROFIT
SHARING PLAN
40119 MURRIETA HOT SPRINGS RD
C105
MURRIETA, CA 92563

HOYT, LARRY & SUZANN
40579 EYOTA CT
MURRIETA, CA 92562

11935

OREM

Development Review Committee (DRC) Application
Ordinance Amendment

Development Services Department 56 North State Street, Orem, Utah (801) 229-7183
www.orem.org

Applicant Information		
Name: Orem Real Estate Group	Phone: 801-326-8886	
Address: 2121 S McClelland St Suite 201	Email: boydbrownkw@gmail.com	
City: Salt Lake City	State: UT	Zip: 84106

Project Information	
Project Name	Keller Williams Office
Project Address	1045 N 1160 W, Orem, UT

	Request	Fees	Total
	Subdivision Text	$1,100	
	Zoning Text	$1,100	
	Sign Text	$1,100	
	Rezone	$1,200 + $25 sign fee	1225
	New PD Zone Text	$2,200 + $25 sign fee	
	Land Use Map Change	$1,000 + ~~$25 sign fee~~	1,000
	General Plan Text Change	$1,000	
	Neighborhood Notice	TBD at time of submittal, if needed	81
	Public Notice	$100 each for PC and CC, if needed	200
	Development Agreement UT Co. Fees	TBD at time of recordation	
	Total		1225

Required Copies

Two (2) full-size copies no larger than 24" x 36", one (1) 11" x 17" and a PDF and/or Word of all applicable drawings and plans. Files can be emailed to Lori Merritt at lpmerritt@orem.org or submitted on disc prior to the deadline.

General Notes, Signature, and Contact Person

Planning Commission/City Council Meetings. Once the Development Review Committee determines your application is complete and complies with all applicable City ordinances, it shall be forwarded to the Planning Commission if required, and City Council, if required. The City Council is the final approving authority of conditional use permits, appeals, City Code amendments, General Plan amendments, fence modifications, and site plans in the following zones: PD-1, PD-4, PD-5, PD-15, PD-16, and PD-21.

Neighborhood Meeting. The applicant shall hold a neighborhood meeting in accordance with City Code for the following requests: General Plan amendments, Zoning Ordinance amendments, commercial development adjacent to a residential zone, all non-residential uses in a residential zone.

DRC Application. The DRC application must be complete at the time of submittal or it may not be accepted.

Filing Fee Notice. Applications filed after July 1 are subject to fee changes regardless of the fee listed on the application used at the time of submittal.

Deadline. The deadline for filing a DRC application is Monday noon for first review the following Thursday. In the case of a Monday holiday, the deadline is Tuesday at noon. Contact information to inquire about the status of an application: Jason Bench, 801-229-7238; David Stroud (south of Center Street) 801-229-7095; Clinton Spencer (north of Center Street) 801-229-7267, Brandon Stocksdale, 801-229-7054.

Applicant's Signature: Boyd Brown

Contact Person: Boyd Brown	Phone: 801-326-8886

Office Use Only

Date Filed: 12/21/15	Fees Paid: 2506.00	Received By:	Receipt #: 2016164830

Project Timeline

Project: Lott's Lots PRD Rezone

1. Neighborhood Meeting held by applicant on: 12/10/15, 2/11/16
2. DRC Application Date: 12/12/15
3. Obtained Development Review Committee Clearance on: 2/8/16 by: CAS
4. Publication notice for PC sent to Recorders office on: 2/5/16 by: CAS
5. Neighborhood notice (500') for Planning Commission mailed on: 2/9/16 by: CAS
6. Planning Division Manager received neighborhood notice on: 2/11/16
7. Planning Commission recommended approval/denial on: 2/17/16 (Approval)
8. Publication notice for CC sent to Recorders office on: 2/5/16 by: CAS
9. Neighborhood notice (500') for City Council mailed on: 2/9/16 by: CAS
10. Planning Division Manager received neighborhood notice on: 2/11/16
11. Property posted for City Council on: by: 3/3/16
12. City Council Approved/Denied on:

CITY OF OREM **CITY COUNCIL MEETING** MARCH 8, 2016	
REQUEST:	**6:30 P.M. PUBLIC HEARING – 2nd Quarter Budget Amendments** **ORDINANCE - Amending the Current Fiscal Year 2015-2016 Budget**
APPLICANT:	City Manager
FISCAL IMPACT:	$1,252,274.42

NOTICES:
-Posted in 2 public places
-Posted on City webpage
-Posted on State Noticing Website
-Faxed to newspapers
-E-mailed to newspapers
-Neighborhood Chair

SITE INFORMATION:
General Plan Designation:
N/A
Current Zone:
N/A
Acreage:
N/A
Neighborhood:
N/A
Neighborhood Chair:
N/A

PREPARED BY:
Richard B. Manning
Admin. Services Dir.

RECOMMENDATION:
The City Manager recommends the City Council hold a public hearing to discuss amending the current Fiscal Year 2015-2016 Budget and, by ordinance, amend Fiscal Year 2015-2016 Budget.

BACKGROUND:
The Fiscal Year 2015-2016 City of Orem budget has many adjustments that occur throughout the fiscal year. These adjustments include grants received from Federal, State, and other governmental or private entities/organizations; receipt of rental fees for use of the City's athletic fields; additional funds received for the adult flag football program due to increased participation; the debt disbursement related to the sale of a piece of property in the Northgate SID that occurred in the prior fiscal year; increasing revenue and available capital project funds due to the previously approved increase to the City's storm sewer fee; and various other smaller technical corrections or minor budget adjustments that need to be made.

DRAFT

ORDINANCE NO. _____

AN ORDINANCE BY THE CITY COUNCIL OF THE CITY OF OREM, UTAH, AMENDING THE FISCAL YEAR 2015-2016 BUDGET

WHEREAS on June 9, 2015, the City Council adopted a final budget following State law; and

WHEREAS the City Council held a public hearing on March 8, 2016, to receive input from the public regarding proposed amendments to the Fiscal Year 2015-2016 budget; and

WHEREAS the budget has been revised as deemed appropriate to accommodate unexpected revenues and expenses; and

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF OREM, UTAH, as follows:

1. The Council hereby amends the Fiscal Year 2015-2016 Budget as shown in Exhibit "A" which is attached hereto and incorporated herein by reference.
2. The City Manager is directed to implement these budget amendments in accordance with State laws and appropriate City procedures.
3. This ordinance shall take effect immediately upon publication.

PASSED AND APPROVED this **8th** day of **March** 2016.

_____
Richard F. Brunst, Jr., Mayor

ATTEST:

_____
Donna R. Weaver, City Recorder

COUNCIL MEMBERS VOTING "AYE"	COUNCIL MEMBERS VOTING "NAY"
_____	_____
_____	_____
_____	_____

DRAFT

BUDGET AMENDMENTS
FISCAL YEAR 2015-2016

REVENUES

Account Number	Note	Description	Previous Budget	Current Budget
		GENERAL FUND		
10-3312-005	1	EMPG Project Grant - Volunteer ID & Tracking	$ -	$ 7,410.00
10-3312-006	1	SVM Grant - Spontaneous Volunteer Management	-	1,000.00
10-3316-020	1	Library - Ut Arts & Museums Onstage in Utah Grant	-	2,000.00
10-3318-005-003	1	HIDTA Grant - Calendar Yr 2016	-	215,286.00
10-3318-018	1	Justice Assistance Grant - CCJJ - FY 2016	-	5,669.00
10-3424-004-001	1	MCTF - Forfeitures Revenues - Federal (Justice)	-	27,000.00
10-3424-004-002	1	MCTF - Forfeitures Revenues - Federal (Treasury)	-	38,000.00
10-3424-009	1	MCTF - Evidence Revenues	-	40,000.00
10-3480-014	3	Fees - Flag Football - Adult	-	6,400.00
10-3620-004	2	Rental Revenues - Athletic Fields	17,000.00	29,275.00
10-3690-003	1	Police Department Donations	293.80	7,313.80
10-3690-009		Misc Revenues - Recreation	-	605.00
10-3690-616	1	Misc Revenues - All-Abilities Playground	-	21,907.42
Total			$ 17,293.80	$ 401,866.22
Net Fund Increase				$ 384,572.42
		DEBT SERVICE FUND		
30-3997-001	4	App. Surp - Northgate SID Bond Call	$ -	$ 720,000.00
Total			$ -	$ 720,000.00
Net Fund Increase				$ 720,000.00
		CAPITAL IMPROVEMENT PROJECT FUND		
45-3995-002		Cont. From - Fund 63 - Fire Station #3 Fence	$ -	$ 2,800.00
Total			$ -	$ 2,800.00
Net Fund Increase				$ 2,800.00
		STORM SEWER FUND		
55-3751	5	Storm Sewer Fees	$ 2,975,000.00	$ 3,117,977.00
Total			$ 2,975,000.00	$ 3,117,977.00
Net Fund Increase				$ 142,977.00
		TIMPANOGOS STORYTELLING FESTIVAL FUND		
72-3316-002		Grant - Westaf Grant	$ -	$ 1,925.00
Total			$ -	$ 1,925.00
Net Fund Increase				$ 1,925.00
Total City Funds			$ 2,992,293.80	$ 4,244,568.22
Net City Funds Increase				$ 1,252,274.42

BUDGET AMENDMENTS
FISCAL YEAR 2015-2016

EXPENDITURES

Account Number	Note	Description	Previous Budget	Current Budget
		GENERAL FUND		
Public Safety Administration				
10-6510-150-001	1	Fringe Benefits - Employee Recognition	$ -	$ 3,500.00
Patrol Services				
10-6520-250-005	1	Equipment - JAG Grant	-	5,669.00
10-6520-290-021	1	Maintenance & Repairs - Fleet	100,000.00	103,520.00
Major Crimes Task Force				
10-6531-140-003	1	Overtime - HIDTA - Jan-June	-	63,326.00
10-6531-230-003	1	Employee Development - HIDTA - Jan-June	-	6,000.00
10-6531-280	1	Telephone & Communications	74,200.00	104,200.00
10-6531-280-004	1	Telephone & Comm. - Forfeitures (Justice)	-	27,000.00
10-6531-280-005	1	Telephone & Comm. - Forfeitures (Treasury)	2,120.47	35,120.47
10-6531-290	1	Maintenance & Repairs	28,000.00	36,000.00
10-6531-290-021	1	Maintenance & Repair - Fleet	-	2,000.00
10-6531-310-005	1	Prof. & Tech. Services - Forfeitures (Treasury)	-	5,000.00
10-6531-600-003	1	C.I. Funds - HIDTA - Jan-June	-	55,000.00
10-6531-623-003	1	Equip/Facility Lease/Rent - HIDTA - Jan-June	-	90,960.00
Emergency Management				
10-7045-480-008	1	Special Dept. Supplies - EMPG Project Grant	-	7,410.00
10-7045-480-009	1	Special Dept. Supplies - SVM Grant	-	1,000.00
Parks				
10-7547-240-001	2	Supplies - Ballfields	19,124.68	31,399.68
10-7547-732-291	1	All-Abilities Playground	-	21,907.42
Recreation / Outdoor Programs				
10-8010-600		Miscellaneous Expenses - T-shirt Sales	2,450.00	3,055.00
10-8114-480	3	Flag Football - Adult	-	6,400.00
Library Administration				
10-8510-310-020	1	Prof. & Technical Services - Arts & Museums Grant	-	2,000.00
Total			$ 225,895.15	$ 610,467.57
Net Fund Increase				$ 384,572.42
		DEBT SERVICE FUND		
30-4521-810-027	4	Principal - Northgate SID Bonds	$ 55,000.00	$ 775,000.00
Total			$ 55,000.00	$ 775,000.00
Net Fund Increase				$ 720,000.00
		CAPITAL IMPROVEMENT PROJECT FUND		
45-6034-731-131		Miscellaneous Projects	$ 78,353.45	$ 81,153.45
Total			$ 78,353.45	$ 81,153.45
Net Fund Increase				$ 2,800.00
		STORM SEWER FUND		
55-7561-736-390	5	Miscellaneous Projects	$ 135,971.27	$ 278,948.27
Total			$ 135,971.27	$ 278,948.27
Net Fund Increase				$ 142,977.00
		TIMPANOGOS STORYTELLING FESTIVAL FUND		
72-8598-310-002		Prof & Tech Services - Westaf Grant	$ -	$ 1,925.00
Total			$ -	$ 1,925.00
Net Fund Increase				$ 1,925.00
Total City Funds			$ 495,219.87	$ 1,747,494.29
Net City Funds Increase				$ 1,252,274.42

BUDGET AMENDMENTS
FISCAL YEAR 2015-2016

NOTES

These notes are attached to the budget amendments summary to describe the more unusual or extraordinary amendments to the Fiscal Year 2015-2016 City of Orem Budget that have been necessitated to this point in the fiscal year. Many of the amendments listed in the summary are immaterial and/or are technical corrections that any organization of this size would expect to encounter during an operating year and therefore, no specific note has been given for these items. Please contact Brandon Nelson, Accounting Division Manager, at 801-229-7010, if you have any questions or concerns.

1) The City receives grant or donation funds during the year to aid many different operations such as the Police Department (Major Crimes Task Force Grants), Fire Department (Emergency Management Grants), and Library Services (Utah Arts & Museums). The funds are received from Federal, State, and other governmental (or private) entities. These entries represent the adjustments necessary to adjust the appropriate budgets.

2) The Recreation Department received various rental income from the use of the City's athletic fields. Thus, this amendment increases the budgeted revenues to match the revenues received and adds expenditure funds to the parks division to cover their field preparation costs.

3) The City's adult flag football program significantly increased its participation levels. Thus, this amendment increases the budgeted revenues to match the revenues received and adds expenditure funds for use within the program which will increase due to the higher number of participants.

4) Near the end of the prior fiscal year, special assessment funds were received by the City from the sale of property located within the Northgate Village SID project. These "excess" funds are to be used to "call" outstanding bond debt in Fiscal Year 2015-2016. This amendment appropriates Debt Service Fund reserves created by the receipt of these "excess" funds from the prior year and authorizes their use to make this additional bond principal payment.

5) At the City Council meeting held on February 23, 2016, an increase to the storm sewer utility rate was approved. The rate per Equivalent Service Unit (ESU) will increase from $5.25 to $6.25 and will go into effect on April 1, 2016. Due to this increase, current fiscal year storm sewer fee revenues will increase by an estimated $142,977. This budget amendment adds this increase to the current budgeted storm sewer fee revenues as well as increasing available funds in the storm sewer fund's capital projects.

CITY OF OREM **CITY COUNCIL MEETING** MARCH 8, 2016	
REQUEST:	**RESOLUTION – Adopt the 2016 Sewer Master Plan and accept the Sewer User Rate Study**
APPLICANT:	Public Works Director
FISCAL IMPACT:	None in FY2017

NOTICES:
-Posted in 2 public places
-Posted on City webpage
-Posted on the State noticing website
-Faxed to newspapers
-E-mailed to newspapers
-Neighborhood Chair

SITE INFORMATION:
General Plan Designation:
N/A
Current Zone:
N/A
Acreage:
N/A
Neighborhood:
N/A
Neighborhood Chair:
N/A

PREPARED BY:
Neal Winterton
Water Resources
Division Manager

RECOMMENDATION:
The Public Works Director recommends that the Orem City Council, by resolution, adopt the 2016 Sewer Master Plan prepared by Bowen Collins & Associates, Inc. (BCA) and accept the Sewer User Rate Study prepared by Lewis Young Robertson & Burningham, Inc (LYRB).

BACKGROUND:
The Orem Water Reclamation Facility (OWRF) was constructed in 1958. Major upgrades were completed in 1984, 1994, and 2012. The OWRF treats an average of 8 million gallons of sanitary sewer per day. The OWRF includes 160 pumps, high-tech controls and instruments, blowers, digesters, clarifiers, back-up generators, and a recently added ultra-violet disinfection system. Following a very strict and specific permit issued by the State of Utah Division of Water Quality (DWQ), which is regulated by the USEPA Region 8, the OWRF discharges treated water to Powell Slough. The collection system consists of over 287 miles of pipe, 6,000 manholes, 6 lift stations, 6 miles of pressurized force main.

In February 2014, the City hired BCA to perform a Sewer Master Plan. The request for engineering services was organized into 12 tasks. Some of the highlights include: develop a hydraulic model, identify existing and future needs, develop a Capital Facilities Plan, recommend a solution to the struvite problem at the OWRF, evaluate maintenance and manpower, and develop sewer rates to support the operations and capital needs of the sewer utility. Together with City staff, the Public Works Advisory Commission, the general public, and the City Council, BCA has created a sewer master plan for consideration.

Recommended improvements identified by BCA include improvements to both the OWRF and the collection system totaling $48 million (present value). Some projects are identified by specific address and others, in future years, are yet to be determined and will be constructed as the need is identified with a full condition assessment. The City sewer maintenance efforts include CCTV and inspection - about 20,000' per month. More than half of the City's sewer collection system consists of concrete pipe that is susceptible to hydrogen sulfide gas. Lining concrete pipe prior to losing its integrity or completely failing is a measure similar to overlaying a road versus total reconstruction. The rehabilitation extends the life of the

pipeline, is about 30-40% of the cost and, in the case of sewer, prevents a potentially disastrous event.

LYRB was subcontracted by BCA to review the existing sewer rates and provide a recommended rate schedule based on changes in forecasted expenses and capital improvements and on a pay-as-you-go basis. The primary objectives of the rate analysis were to ensure sufficient revenues to cover all operation and maintenance expenses while maintaining bond covenants, ensuring the appropriate debt service coverage ratio, and providing sufficient revenue to fund the proposed projects identified in the master plan.

A review of projected revenues under the existing rate structure relative to proposed expenses illustrated that the City would not have sufficient revenues to fund the needed capital improvements without a rate increase. The results of this master plan were the basis for a rate study that was used to establish supporting sewer rates for the City. Originally, a 5-year rate increase was proposed by City staff in conjunction with BCA and LYRB. After receiving public feedback and upon the recommendation of the City Council, a pay-as-you-go funding plan over 5-, 7-, and 10-year periods, and a bonding plan, were developed.

In January 2016, the City Council adopted a plan to change the billing procedure for the sewer base rate for multi-unit residential accounts and non-residential accounts with a water meter larger than 3/4 inch. Due to the change, in the first year of all plans a rate increase was not deemed necessary.

The rate scenarios shown below are structured to produce a 2026 final base rate of $16.03 and a final volume rate of $3.66/1,000 gallons. Scenarios 2 and 3 fund a reduced CIP in order to allow for a more moderate annual increase in the rates. Scenarios 2 and 3 result in an overall revenue reduction of $2,527,838 and $5,885,836, respectively, over the same 10-year period. The result is a delay in completion of capital facility projects and an on-going liability for increased sewer line maintenance and potential failures. Scenario 4 includes some bonding and allows for projects to be completed within the 5-year CIP plan but keep rates to more moderate increases.

Scenario 1: 5-Year					
Year	Base Rate	Production Rate	Monthly Increase per SFH	Cumulative Monthly Increase	Total CIP
2016	$9.32	$1.42	$0.00	$0.00	$1,000,000
2017	$9.32	$1.42	$0.00	$0.00	$2,339,818
2018	$9.32	$2.13	$5.68	$5.68	$3,808,706
2019	$10.72	$2.45	$3.96	$9.64	$4,748,215
2020	$12.11	$2.77	$3.95	$13.59	$5,574,372
2021	$13.44	$3.07	$3.73	$17.32	$6,435,555
2022	$14.11	$3.22	$1.87	$19.19	$6,656,442
2023	$14.67	$3.35	$1.60	$20.79	$6,884,902
2024	$15.11	$3.45	$1.24	$22.03	$7,121,196
2025	$15.56	$3.55	$1.25	$23.28	$7,365,592
2026	$16.03	$3.66	$1.35	$24.63	$7,589,560
Effect on CIP	$0				

Scenario 2: 7-Year					
Year	Base Rate	Production Rate	Monthly Increase per SFH	Cumulative Monthly Increase	Total CIP
2016	$9.32	$1.42	$0.00	$0.00	$1,000,000
2017	$9.32	$1.42	$0.00	$0.00	$2,339,818
2018	$9.32	$1.85	$3.44	$3.44	$3,282,893
2019	$10.72	$2.18	$4.04	$7.48	$4,170,292
2020	$12.33	$2.53	$4.41	$11.89	$5,053,328
2021	$13.56	$2.78	$3.23	$15.12	$5,831,885
2022	$14.37	$3.00	$2.57	$17.69	$6,357,901
2023	$14.94	$3.24	$2.49	$20.18	$6,884,902
2024	$15.39	$3.40	$1.73	$21.91	$7,121,196
2025	$15.77	$3.57	$1.74	$23.65	$7,365,592
2026	$16.03	$3.66	$0.98	$24.63	$7,586,560
Effect on CIP	$2,527,838				

Scenario 3: 10-Year					
Year	Base Rate	Production Rate	Monthly Increase per SFH	Cumulative Monthly Increase	Total CIP
2016	$9.32	$1.42	$0.00	$0.00	$1,000,000
2017	$9.32	$1.42	$0.00	$0.00	$2,339,818
2018	$9.32	$1.85	$3.44	$3.44	$3,082,893
2019	$10.44	$2.07	$2.88	$6.32	$3,870,292
2020	$11.69	$2.32	$3.25	$9.57	$4,653,328
2021	$12.86	$2.55	$3.01	$12.58	$5,231,885
2022	$13.89	$2.75	$2.63	$15.21	$5,757,901
2023	$14.72	$2.97	$2.59	$17.80	$6,271,586
2024	$15.31	$3.21	$2.51	$20.31	$6,702,834
2025	$15.72	$3.47	$2.49	$22.80	$7,139,571
2026	$16.03	$3.66	$1.83	$24.63	$7,586,560
Effect on CIP	$5,885,836				

Scenario 4: Bonding					
Year	Base Rate	Production Rate	Monthly Increase per SFH	Cumulative Monthly Increase	Total CIP
2016	$9.32	$1.42	$0.00	$0.00	$1,000,000
2017	$9.32	$1.42	$0.00	$0.00	$2,339,818
2018	$9.32	$1.85	$3.44	$3.44	$7,243,498
2019	$10.25	$2.07	$2.69	$6.13	$3,503,661
2020	$11.28	$2.32	$3.03	$9.16	$4,250,862
2021	$12.41	$2.55	$2.97	$12.13	$11,756,043
2022	$13.40	$2.75	$2.59	$14.72	$4,774,233
2023	$14.34	$2.97	$2.70	$17.42	$5,304,597
2024	$15.06	$3.21	$2.64	$20.06	$5,756,898
2025	$15.59	$3.47	$2.61	$22.67	$6,213,169
2026	$16.03	$3.66	$1.96	$24.63	$6,681,504
Effect on CIP	$0				

DRAFT

RESOLUTION NO. _____

A RESOLUTION OF THE OREM CITY COUNCIL ADOPTING THE 2016 SEWER MASTER PLAN AND ACCEPTING THE SEWER USER RATE STUDY

WHEREAS the City of Orem operates a sewer utility that includes the Orem Water Reclamation Facility (OWRF) and a collection system; and

WHEREAS this master plan was divided into five main areas: (1) develop a hydraulic model, (2) develop a Capital Facilities Plan, (3) recommend a solution to the struvite problem at the OWRF, (4) evaluate maintenance and manpower needs, and (5) develop sewer rates to support the operations and capital needs of the sewer utility; and

WHEREAS funding levels for repair and replacement of infrastructure is limited and not meeting the projected need; and

WHEREAS in February 2014, the City of Orem began a planning process with Bowen Collins and Associates, Inc. (BCA) to review, evaluate, and update the 2000 Sewer Master Plan; and

WHEREAS the primary purpose of the master plan is to provide recommended improvements to resolve existing and projected future deficiencies in the City's sewer system; and

WHEREAS Lewis Young Robertson & Burningham, Inc. (LYRB) was subcontracted by BCA to review the existing sewer rates and provide a recommended rate schedule based on changes in forecasted expenses and capital improvements and on a pay-as-you-go basis for a 5-, 7-, and 10-year period as well as a bonding scenario; and

WHEREAS the primary objectives of the rate analysis were to ensure sufficient revenues to cover all operation and maintenance expenses while maintaining bond covenants, ensuring the appropriate debt service coverage ratio, and providing sufficient revenue to fund the proposed projects identified in the master plan; and

WHEREAS the results of this master plan were the basis for a rate study that was used to establish supporting sewer rates for the City; and

WHEREAS upon the recommendation of the City Council, a pay-as-you-go funding plan over 5-, 7-, and 10-year periods and a bonding scenario were developed; and

WHEREAS each of the rate scenarios recommend a base rate of $16.03 and production rate of $3.66/1,000 gallons after ten years from implementation.

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF OREM, UTAH, as follows:

DRAFT

1. The Orem City Council hereby adopts the 2016 Sewer Master Plan and accepts the Sewer User Rate Study, copies of which are attached hereto as Exhibits "A" and "B", respectively, and incorporated herein by reference.

2. All acts, orders, resolutions and ordinances, and parts thereof, in conflict with this Resolution are hereby rescinded.

3. This Resolution shall become effective immediately upon passage.

PASSED AND APPROVED this **8th** day of **March** 2016.

_____
Richard F. Brunst, Jr., Mayor

ATTEST:

_____
Donna R. Weaver, City Recorder

COUNCIL MEMBERS VOTING "AYE"	COUNCIL MEMBERS VOTING "NAY"

DRAFT

EXHIBIT A

Sewer Master Plan

February 2016

Prepared by:

Bowen Collins & Associates, Inc.
CONSULTING ENGINEERS

Prepared for:

OREM

SEWER MASTER PLAN

February 2016

Prepared for:

OREM

Prepared by:

Bowen Collins & Associates, Inc.
CONSULTING ENGINEERS

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CHAPTER 1
INTRODUCTION

INTRODUCTION

Orem City has retained Bowen Collins & Associates (BC&A) to prepare a master plan for the City's wastewater collection system. The purpose of this sewer master plan report is to identify recommended improvements that will resolve existing and projected future deficiencies in the wastewater collection system throughout the City's service area. The results of this study will be incorporated into a Rate Study that will be used to establish wastewater user rates for the City.

SCOPE OF SERVICES

The general scope of this project involved a thorough analysis of the City's sewer collection system and its ability to meet the present and future wastewater needs of its residents. As part of the Sewer Master Plan, BC&A completed the following tasks.

Task 1: Collected information as needed to develop the sewer master plan based on the City's general plan and existing facilities.

Task 2: Updated population projections and estimated growth in sewer flow to evaluate future growth needs.

Task 3: Developed a hydraulic computer model of the Orem City collection system to evaluate existing and projected future system deficiencies. This included calibrating the model using data from the City's existing GIS database and water meter data from the City.

Task 4: Identified existing operating deficiencies.

Task 5: Identified projected future operating deficiencies.

Task 6: Evaluated alternative improvements for resolving deficiencies identified in Tasks 4 and 5. This included evaluating alternatives looking at diversion locations and reuse opportunities.

Task 7: Developed a comprehensive capital facilities plan incorporating all required improvements identified for the collection system.

Task 8: Documented results of the previous tasks in a report with additional memoranda as needed. As part of this task, BC&A also made presentations to the City's public advisory committee and City Council in meetings throughout the project.

In association with the master planning process, BC&A performed several additional evaluations relative to the Orem City sewer system. The results of these evaluations are contained in technical memoranda attached at the end of this report. This included the following:

- A struvite evaluation at the wastewater reclamation facility
- An evaluation of maintenance and manpower requirements in the City

In conjunction with the master plan, a rate study was also completed by BC&A's financial subconsultant, Lewis Young Robertson & Burningham. The results of their activities are documented in a separate report.

This document is a working document. Some of the recommended improvements identified in this report are based on the assumption that development and/or potential annexation will occur in a certain manner. If future growth or development patterns change significantly from those assumed and documented in this report, the recommendations may need to be revised. The status of development should be reviewed at least every five years. This report and the associated recommendations should also be updated every five years.

ACKNOWLEDGMENTS

The BC&A team wishes to thank the Public Works Advisory Committee as well as the following individuals from Orem City for their cooperation and assistance in working with us in preparing this report:

Chris Tschirki	Public Works Director
Neal Winterton	Water Resources Division Manager
Joseph Jamison	GIS Specialist / Sewer Collection Project Manager
Lawrence Burton	Water Reclamation Section Manager
Tom Phelps	Information Technology

PROJECT STAFF

The project work was performed by the BC&A's team members listed below. Team member's roles on the project are also listed. The project was completed in BC&As' Draper, Utah office. Questions may be addressed to Keith Larson, Project Manager at (801) 495-2224.

Mike Collins	Principle in Charge
Keith Larson	Project Manager
Andrew McKinnon	Project Engineer
Aaron Anderson	Staff Engineer, Sewer Modeling
Mike Hilbert	Clerical

CHAPTER 2
EXISTING SYSTEM FEATURES

INTRODUCTION

As part of this Master Plan, BC&A has assembled an inventory of existing infrastructure within the sewer collection system. The purpose of this chapter is to present a summary of the inventory of Orem City's existing sewer collection system that can be used as a reference for future studies.

SERVICE AREA

The Orem City sewer system service area as shown in Figure 2-1 is approximately 20 square miles and is bordered by the following: Mount Timpanogos to the east, Utah Lake and Vineyard to the west, Lindon City to the north, and Provo City to the south and east. The service area generally follows the corporate boundaries of the City; however, there are some areas that deviate from this general conclusion as a result of topography limitations and historic development patterns. This includes areas of Lindon City (to the north) and the Town of Vineyard (to the west) that are served by the Orem City collection system. There are also small areas at the south end of Orem City that flow to the Provo City wastewater treatment plant. There are even a few small areas of Orem City's collection system that flow through parts of Lindon's collection system on their way to Orem's treatment plant. The areas where each of these situations apply are identified on Figure 2-1.

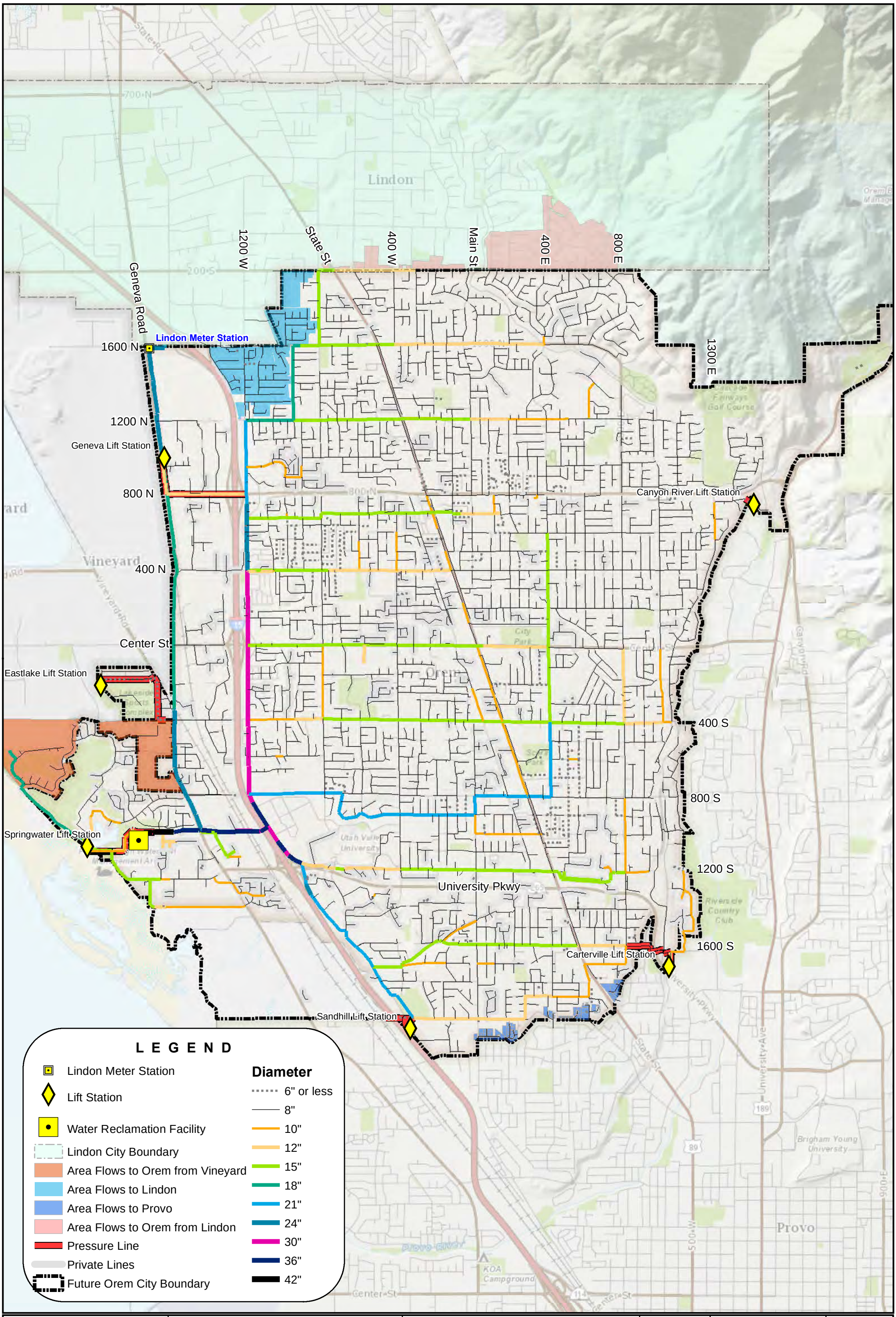
Wastewater from the City's collection system service area is treated at the Orem City Water Reclamation Facility. Additionally, the reclamation facility treats all of Lindon City's existing wastewater, most of which is metered at the Lindon Meter Station indicated in Figure 2-1. In 2014, the total population served by the reclamation facility included approximately 90,000 permanent residents in Orem City with an additional 10,000 permanent residents from Lindon City. In addition to permanent residents, the City also serves the Utah Valley University student and faculty population along with many other commercial, industrial, and institutional entities. The east side of the City is largely residential and is mostly built out. The west side of the City includes significant commercial/industrial, with some large areas still available for future development.

TOPOGRAPHY

The topography of the City generally slopes from northeast to southwest with the City's treatment plant located at the southwest edge of the City (next to Utah Lake). Most of the City collection system flows by gravity to the treatment plant, but a few areas do require lift stations (6 total). All of the wastewater flow from Lindon must be pumped through the City's largest lift station on Genene Road.

COLLECTION SYSTEM

Major attributes of the various components of the collection system are summarized in the following sections.



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CONSULTING ENGINEERS

OREM CITY
SEWER MASTER PLAN

EXISTING COLLECTION SYSTEM

NORTH:

SCALE: 0 1,500 3,000 Feet

FIGURE NO. 2-1

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Sewer Collection Pipes

There are about 1.5 million feet (286 miles) of sewer pipe and over 6,400 manholes in the Orem City Sewer System that are cataloged in the GIS database. Table 2-1 contains a summary of the sewer pipes for the Orem City sewer collection system. As can be seen in the table, 80 percent of the pipe in the system is 8 inches in diameter. This represents the vast network of small collection mains in neighborhoods throughout the City.

Table 2-1
Sewer Collection System Sizes and Lengths

Diameter	Length (ft)	Length (mi)	Percentage
4*	3,982	0.75	0.3%
6	64,888	12.29	4.3%
8	1,193,295	226.00	78.9%
10	59,253	11.22	3.9%
12	43,472	8.23	2.9%
15	74,131	14.04	4.9%
18	18,182	3.44	1.2%
21	24,777	4.69	1.6%
24	12,040	2.28	0.8%
27	834	0.16	0.1%
30	9,495	1.80	0.6%
33	2,209	0.42	0.1%
36	3,169	0.60	0.2%
42	2,493	0.47	0.2%
Total	**1,512,219**	**286.41**	**100.0%**

*Service laterals are not included in the collection system lengths.

Table 2-2 provides a summary of the pipeline materials used in the City's wastewater collection system. As indicated in the table, concrete pipe is the most common pipe material in the system. There is also a large portion of the system where pipeline material is unknown. Given the age of the areas where pipeline material is unknown, it is suspected that most of this pipe is also concrete. In the end, as much as 80 percent of the collection system may be concrete pipe.

The high percentage of concrete pipe in the City collection system may create some challenges in the future. While concrete is generally a durable, long lasting material, it is extremely susceptible to corrosion associated with hydrogen sulfide gas. As part of the City's long term maintenance plans, it will likely need to perform extensive rehabilitation to protect its existing concrete pipelines from hydrogen sulfide related corrosion. This is discussed in greater detail in subsequent chapters of this report.

Because of its resistance to hydrogen sulfide related corrosion, PVC is now the preferred material of construction for most new sewer mains. As the City continues to rehabilitate and replace older existing lines, it is anticipated that the percentage of PVC will gradually increase.

Table 2-2
Sewer Collection System Materials

Pipe Material	Percentage
Concrete	42.1%
Unknown	39.6%
PVC	15.8%
Other*	2.5%

*Clay, ADS, cast iron, resin liners

Diversions

The City has a single diversion near UVU and I-15 that uses an overflow weir to send excess flow through a parallel pipe underneath I-15 and the UTA and Union Pacific railroad tracks. The overflow is not used under dry weather flow conditions, but may function during wet weather to prevent surcharging conditions. In addition to this diversion, there are a number of manholes in the City that have potential overflow pipes that are primarily used for flushing lines and maintenance. These overflow diversions are discussed more in Chapter 4.

Sewer Lift Stations

There are 6 sewer lift stations in the Orem City sewer collection system that are owned and operated by Orem City. The City's lift stations range in capacity from 300 to 1,200 GPM. Where possible, pump curves and as built drawings were collected for each lift station and are included in Appendix A. A summary of the lift station data is listed in Table 2-3.

Table 2-3
Summary of Sewer Lift Stations

Name	Address	Capacity (gpm)*	Wet Well Volume (cf)	Power (HP)	No. Pumps
Carterville Lift Station	1720 S 1030 E	500	350	40	2
Geneva Lift Station - to Geneva Road	1002 N Geneva Rd	833	1,851	10	2
Geneva Lift Station - to 1200 West	1002 N Geneva Rd	1,187		75	2
Springwater Lift Station	2100 W 1000 S	850	300	23	2
Eastlake Lift Station	1991 W 180 S	300	175	15	2
Canyon River Lift Station	155 N 1550 E	300	280	25	2
Sandhill Lift Station	2082 S Sandhill Rd	300	211	10	2

*each lift station is also equipped with a variable frequency drive to reduce pump cycles and limit stagnation.

Note that the Geneva Lift station can discharge to two different gravity mains (1200 West and Geneva Road) that flow to the City's reclamation facility. For normal dry weather flow, the City normally discharges to Geneva Road. However, for wet weather conditions, inflow from Lindon can significantly exceed normal dry weather flows. For these conditions, the City may pump to 1200 West using a separate set of pumps and force main.

OREM CITY WATER RECLAMATION FACILITY

The Orem City Water Reclamation Facility (WRF) is located at 1797 West 1000 South and was first constructed in 1958. The WRF includes a pretreatment headworks that screens the raw influent prior to pumping it to the main treatment plant for secondary treatment. The secondary treatment process includes primary clarifiers, aerobic and anaerobic digesters, secondary clarifiers, and dissolved air flotation. Solids handling facilities at the WRF include gravity thickeners, an oxidation ditch, return and waste activated sludge, and a belt press. Effluent is treated with ultraviolet disinfection prior to discharging to the Powell Slough toward Utah Lake. The WRF has a peak month, average day capacity of 13.5 mgd, with a peak hydraulic capacity of 21.6 mgd.

These capacities are based upon cursory review of data provided by City personnel. It is recommended that a Facility Study for the entire treatment process be completed. The Facility Study will provide a comprehensive look at the entire treatment process, and would identify cost effective alternatives for meeting the future needs of Orem City.

CHAPTER 3
FUTURE GROWTH AND FLOW PROJECTIONS

INTRODUCTION

Before attempting to hydraulically model and evaluate the City's sewer collection facilities, one must first have an accurate understanding of wastewater flows. This includes an estimate of both the quantity and distribution of existing and future flows. The purpose of this chapter is to summarize the results, assumptions, and process of calculating both existing and future wastewater flows.

There are three major components of wastewater flow: domestic wastewater, infiltration, and inflow. Each of these is discussed in detail in this chapter.

DOMESTIC WASTEWATER

Domestic wastewater includes all wastewater produced by system customers, including both residential and commercial customers. There are several methods that can be used to estimate domestic wastewater flow. This study develops domestic wastewater flow projections based on both full time residential population and employment population. The methodology of this study can be summarized as follows:

1. Define the service area.
2. Divide the service area into a number of smaller sub-areas using geographical information system (GIS) mapping.
3. Project residential population for each sub-area based on existing and projected patterns of development.
4. Project employment and other non-residential populations for each sub-area based on existing and projected patterns of development.
5. Adjust projections as required to accommodate areas of special growth consideration including "planned development" zones (PD Zones), Utah Valley University, University Mall Redevelopment, and the Southwest Annexation Area.
6. Estimate the domestic wastewater contribution of each factor (residential and non-residential) based on a statistical analysis of existing levels of development and historic water use in each sub-area.
7. Convert projections of residential and non-residential development to wastewater flow rates based on their historic contributions.

Each step of this process is summarized in the sections below.

STUDY AREA

The study area for this analysis is generally the same as the City's municipal boundary as shown in Figure 3-1 with additional flow inputs from Lindon City (which are conveyed to the City's treatment facility via Geneva Road) and Vineyard City. It is expected that the sewer collection system will continue to expand to provide service to new development within the City, but that services will not extend much beyond the City's current corporate boundaries and the small collection areas in Vineyard and Lindon currently served by the City's collection system. Orem City's collection system will eventually serve all areas in Vineyard south of 400 South.

TRAFFIC ANALYSIS ZONES

Division of the service area into smaller sub-areas is important for two reasons. First, it increases the accuracy of the population and flow projections by examining land use and development patterns at a smaller scale. Second, it yields projections that are distributed spatially across the service area, an important requirement for future modeling efforts.

For this study, sub-areas were defined based on Traffic Analysis Zones (TAZ). A TAZ is the smallest geographic unit used for residential and non-residential population projections developed by the Mountainland Association of Governments (MAG). Non-residential population data includes employees, retail, industrial, and other non-residents. TAZ boundaries are established on an arbitrary basis by MAG for travel demand modeling.

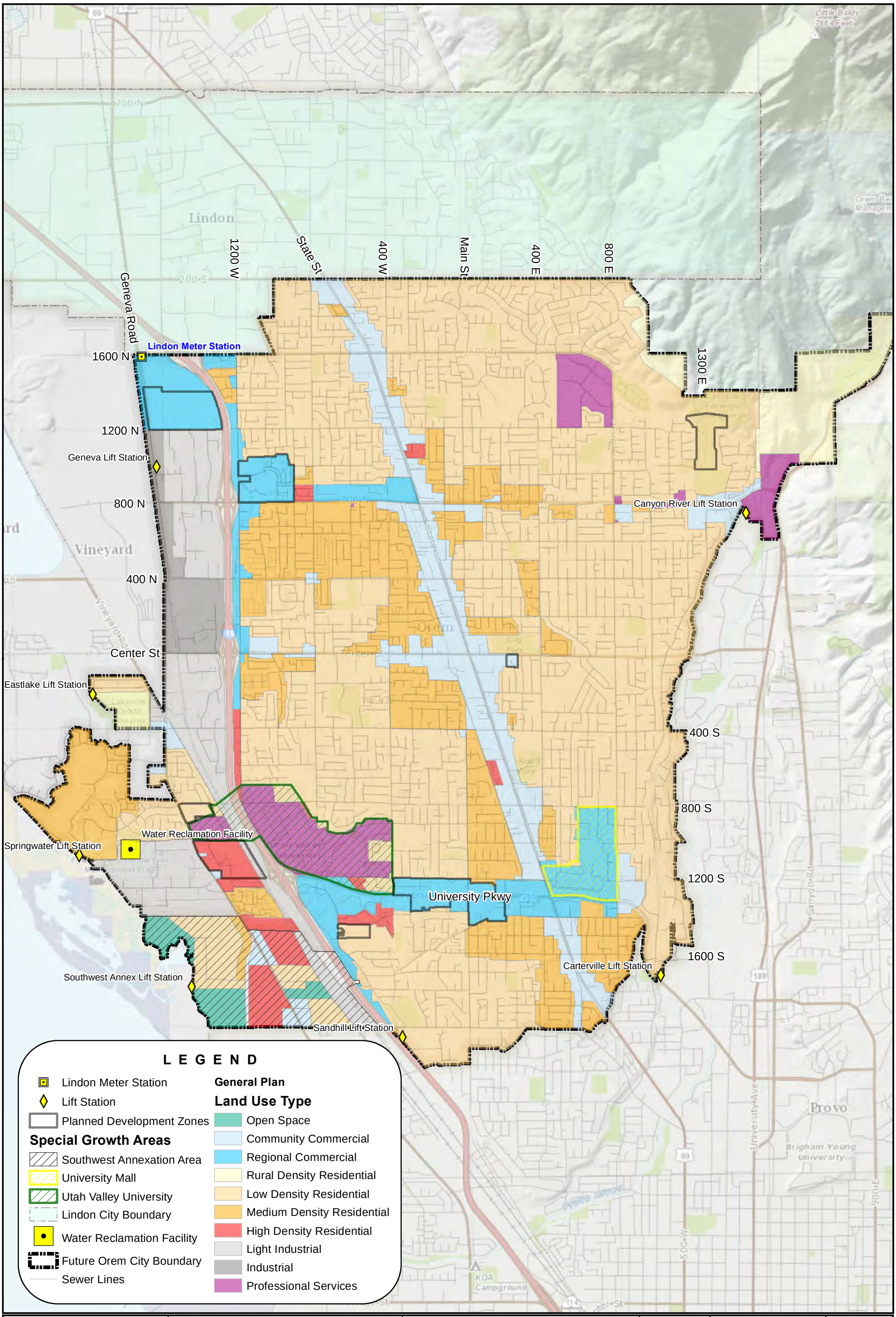
TAZ boundaries were used for this analysis because population projections have already been developed from census data for TAZ areas by MAG. The projections are provided every 5-years starting in 2010 and continuing to 2040. TAZ boundaries were also used because they are small enough to give an adequate distribution of flow across the service area for use in modeling. The TAZ boundaries used in this analysis are shown on Figure 3-2. As can be seen in the figure, TAZ boundaries are not always consistent with the City's service area boundaries. If a TAZ was only partially in the study area boundary, then the percentage inside the boundary was determined. MAG projections were multiplied by this percentage to determine the portion of the TAZ projection within the study area boundary.

OREM CITY RESIDENTIAL AND NON-RESIDENTIAL POPULATIONS

Population projections for the City have been developed using the City's General Plan, population projections from the Governor's Office of Management and Budget (GOMB) and Mountainlands Association of Government. Residential and non-residential projections were developed for two periods: Present to 2040, and 2040 to 2060. The methodology varies slightly for each period.

Projections from Present to 2040

The population projections, from present to 2040, were initially taken from the MAG Population Projection Report, 2011 Baseline. The MAG projections were then adjusted with input from City personnel for the special areas of consideration noted above and for key "planned development" zones (PD Zones). PD Zones are identified separately because of the relatively wide variability in



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OREM CITY
SEWER MASTER PLAN

OREM CITY GENERAL PLAN & SPECIAL GROWTH AREAS

NORTH:

SCALE: 0 1,500 3,000 Feet

FIGURE NO. 3-1

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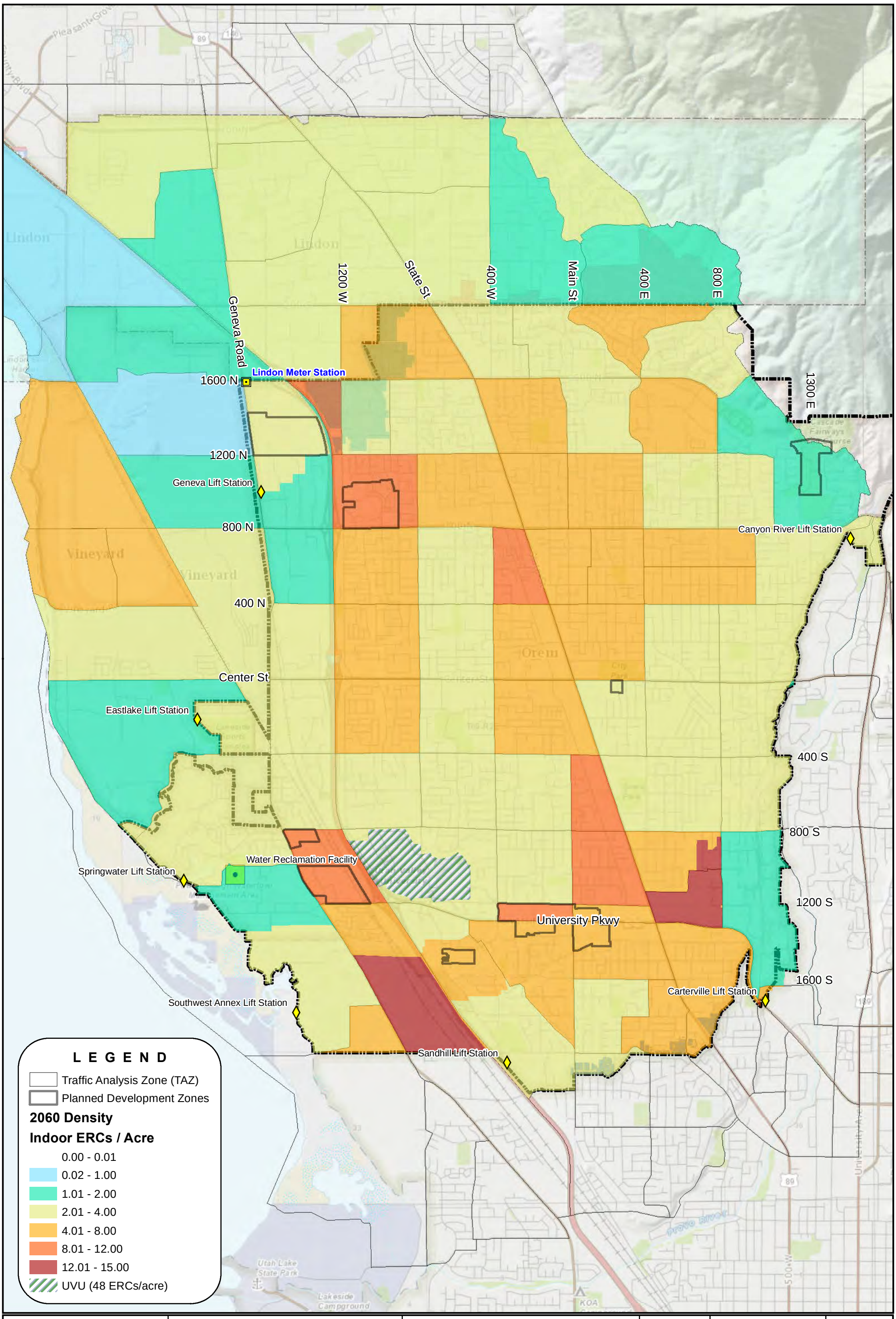

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OREM CITY
SEWER MASTER PLAN

2060 DEVELOPMENT DENSITY
INDOOR ERCS PER ACRE

NORTH:

SCALE: 0 1,500 3,000 Feet

FIGURE NO. 3-2

P:\Orem City\2013 Master Plans\4.0 GIS\4.1 Projects\SewerMap\Sewer-Figure 3-2 - Development Density.mxd amckinnon 4/20/2015

types of development that may be incorporated into a PD Zone (including commercial, industrial, mixed use development, student housing). In general, PD Zones are intended to be consistent with the underlying General Plan designation, but may include other development types in the zone in accordance with City and developer interests for the site.

The modified MAG projections were used to estimate where growth will occur in the City. MAG will be updating its projections in the near future, but for the purpose of this study, the distributions used from the 2011 baseline were considered adequate with modifications by City personnel to reflect City estimates. Residential and non-residential populations were treated separately and independently for these projections.

The Southwest Annexation Area was treated somewhat independently for these projections. This area of the City has its own planning documents that have defined buildout wastewater production. An equivalent residential population for this area was developed for this area using the wastewater projections from the August 2015 "Sanitary Sewer Impact Fee Facilities Plan and Impact Fee Analysis" prepared by Lewis Young Robertson and Burningham. This area is shown to be completly built out by the year 2027.

Projections from 2040 to 2060 - Residential

The detailed MAG projections only extend to 2040. Because this does not cover the full planning window of this sewer master plan, growth beyond the year 2040 needed to be examined and incorporated into this study. A buildout estimate of growth was estimated for each area of the City by extrapolating the population from 2040 to 2060 using the final growth rate in the MAG projections for all areas with a positive growth rate (some areas have a negative growth rate associated with declining population). This estimate was compared to the overall GOMB projection for total City population at 2060 and adjustments were made within the special areas of consideration or PD Zones so that the 2060 population distribution matched the 2060 GOMB residential population estimate. Figure 3-2 shows an estimate of equivalent residential connections per acre in 2060 using an average household size of 3.34 persons/household (2008 – 2012 estimate for Orem City).

Projections from 2040 to 2060 – Nonresidential

For non-residential growth, a buildout estimate of growth was estimated by extrapolating from 2040 to 2060 using the final growth rate in the MAG projections for all areas with a positive growth rate. No other adjustments were made for non-residential growth.

Projections for UVU – Nonresidential

Because Utah Valley University (UVU) makes up a significant portion of City-wide wastewater production, and has a significant potential for growth, projections for UVU were treated separately from other nonresidential projections. Based on UVU's current Master Building Plan, the square footage of buildings on the UVU campus is estimated to approximately double to accommodate future student populations in Orem City. As a result, wastewater production for the campus will

also likely double in the future. Projections for UVU assume funding for expansion projects on campus will be uniform through 2060 so that a student population of approximately 53,000 students is reached in 2060. It should be noted that the student population has been used to project wastewater growth for UVU rather than building square footage because an accurate estimate of the existing building square footage was not available during this study. With either approach, the estimated wastewater is anticipated to double within the planning window.

The results of the residential and non-residential projections described above are summarized in Tables 3-1 and 3-2.

Table 3-1
Residential Population Projections

Year	Orem[1] Residential Population	Lindon Residential Population	Vineyard[2] Residential Population	Southwest[3] Annexation Population	Total Residential Population
2010	88,328	10,134	69	0	98,531
2013	91,466	10,595	90	0	102,151
2020	99,227	11,753	223	1,219	112,422
2030	103,321	12,459	526	5.611	121,917
2040	112,288	13,721	727	5,611	132,347
2050	118,900	14,600	788	5,611	139,899
2060	123,600	15,900	806	5,611	145,917

[1]A small portion of the Orem City service area contributes wastewater to Provo City. This area was neglected for Table 3-1.
[2]The estimated service area population from Vineyard City includes all areas in Vineyard south of 400 South and is based on the residential population distribution derived from Mountainland Association of Governments Traffic Analysis Zones.
[3]The residential population indicated for the Southwest Annexation area was calculated based on a build-out flow of 334,646 gpd of wastewater production and the total number of approved ERUs as identified in the area's updated planning documents. For simplicity, all wastewater from the Southwest Annexation Area is being represented as residential.

Table 3-2
Non-Residential Population Projections

Year	Orem[1] Non-Residential Population	Lindon Non-Residential Population	Vineyard[2] Non-Residential Population	Total Non-Residential Population (except UVU)	Total[3] UVU Student Population
2010	130,371	28,225	26	158,622	23,963
2013	135,022	29,509	34	164,565	26,307
2020	146,643	36,584	51	183,278	36,279
2030	155,318	42,121	115	197,554	41,967
2040	161,309	46,158	121	207,588	45,516
2050	164,401	51,487	128	216,016	49,065
2060	167,552	57,431	134	225,117	52,614

[1]A small portion of the Orem City service area contributes wastewater to Provo City. This area was neglected for Table 3-1.
[2]The estimated service area population from Vineyard City includes all areas in Vineyard south of 400 South and is based on the residential population distribution derived from Mountainland Association of Governments Traffic Analysis Zones.
[3]The student population indicated is based on a uniform growth rate through 2060.

DOMESTIC WASTEWATER FLOW PROJECTIONS

The process of using residential and non-residential population data to develop domestic wastewater flow rates was completed by relating the residential and nonresidential indoor water use to wastewater flow rates.

An analysis of indoor water usage for residents, nonresidents, and UVU was developed for Orem City using indoor water meter records. Based on the water meter records, non-residential indoor water use which consists of retail, employment, industrial, and other water uses was equal to approximately 24% of total indoor water use in the City. Based on this data, it was possible to estimate the contribution of wastewater by residential, non-residential, and student populations. Based on the residential and non-residential population data, indoor water meter data, and total influent at the City's wastewater treatment plant, an estimate of per capita domestic wastewater for each user type was developed as summarized in Table 3-3.

Table 3-3
Contribution of Wastewater by User Type

Component	Wastewater Contribution (gpcd)
Residential Population	59.6
Non-Resident Population	11.7
Student Population	31.3

Total domestic wastewater contributions can therefore be estimated by multiplying the projected residential, non-residential, and student populations by their respective per capita wastewater contribution as summarized in Table 3-4.

Table 3-4
Projected Total Domestic Wastewater Flows

Year	Residential Domestic Wastewater Flow (mgd)	Non-Residential Domestic Wastewater Flow (mgd)	UVU Domestic Wastewater Flow (mgd)	Total Domestic Wastewater Flow (mgd)
2013	6.09	1.93	0.83	8.85
2020	6.71	2.14	1.14	9.99
2030	7.27	2.31	1.32	10.90
2040	7.90	2.43	1.43	11.76
2050	8.34	2.53	1.54	12.41
2060	8.70	2.64	1.65	12.99

Water Conservation

It should be noted that the results in the tables above do not include any reduction in future wastewater production associated with conservation. The City currently has a water conservation goal to reduce its per capita water usage (as measured in the year 2000) by 25 percent by the year 2025. A reduction in wastewater flow associated with this projected future conservation was not included for two reasons. First, the projections have been based on recent water use data that already reflects some conservation since the year 2000. Second, the water conservation goal of the City includes consideration of both indoor and outdoor water use. Past history would suggest that the majority of conservation will occur through the reduction of outdoor water use. As a result, the effects of water conservation on indoor water use will likely be relatively small. Because of these two reasons, additional conservation in the future was conservatively ignored for modeling purposes in this study. However, it is possible that, as the City continues to reduce water use through conservation, there may be some effect on indoor water use and domestic sewer flows. This could potentially delay some projected future system deficiencies and associated system improvements. System flow monitoring will be a valuable tool to track changes in domestic sewer production over time and further assess the effects of indoor conservation.

WASTEWATER FLOW DISTRIBUTION

Table 3-4 summarizes total wastewater projections for the City service area as a whole. For hydraulic modeling purposes, these flows must be distributed throughout the service area. For existing conditions, flows were distributed based on winter water use records. The City GIS system includes historic water use records for each meter in the City system. Winter water reads

for each meter were attached to the nearest trunkline manhole in the model to calculate the portion of total domestic wastewater flow associated with each manhole.

To distribute future flows, growth was evaluated by TAZ. The total increase in flow for each TAZ was calculated as described in the sections above. The growth was then distributed to the nearest trunkline manhole within each TAZ. In the case of UVU, increases in flow were assigned to a single manhole because most of the projected expansion will not necessarily require new collection system pipes.

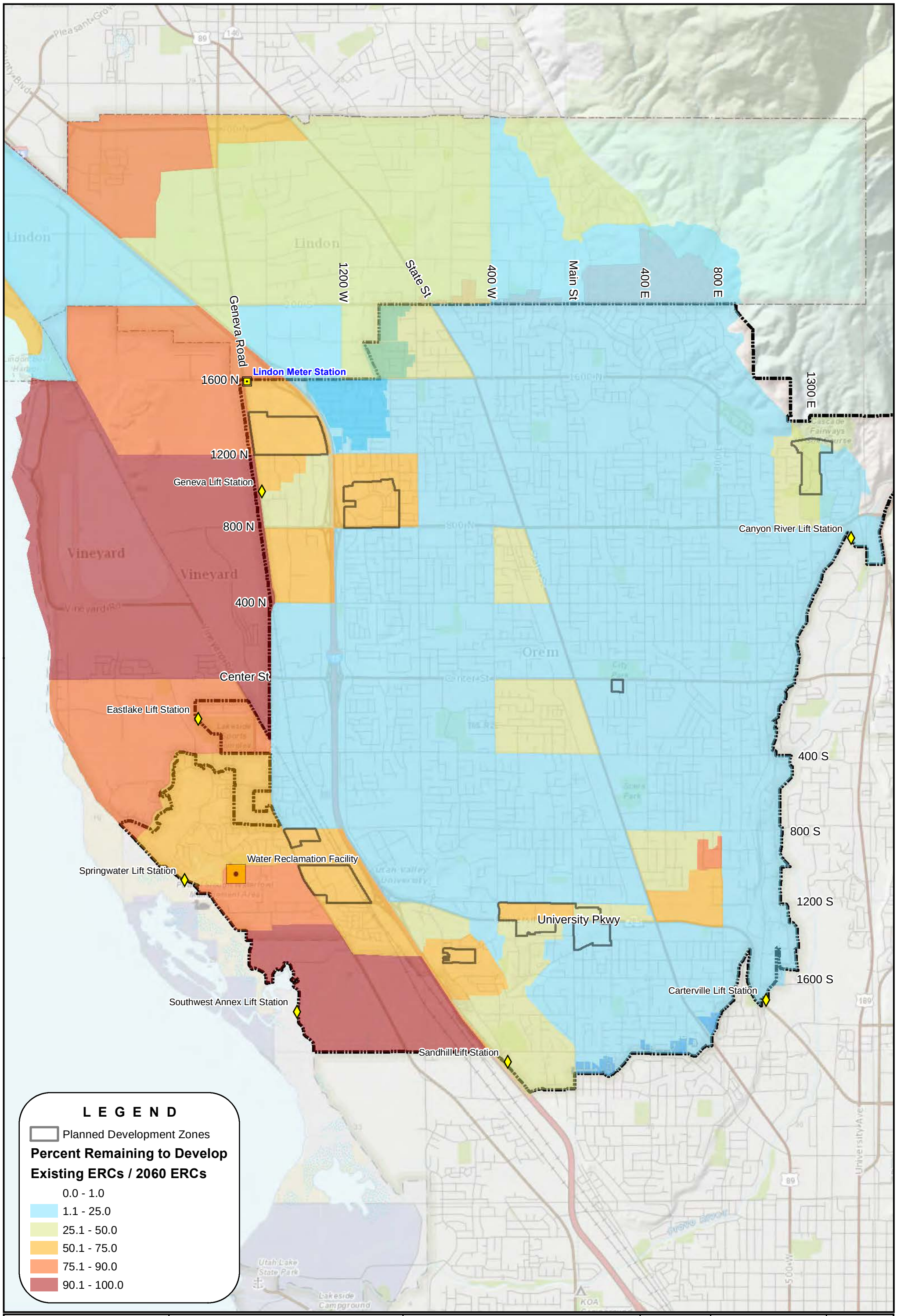
Figures 3-3 shows the potential for growth in Orem based on the estimated percentage of remaining development compared to 2060 in equivalent residential connections.

INFILTRATION

Beyond domestic wastewater contributions, the second component of wastewater flow that must be considered is infiltration. Infiltration is defined as water that enters into the sewer system which is not directly or indirectly related to either domestic wastewater or to a specific storm event. This flow can enter as a result of open pipe joints, cracks in pipes, pipes poorly connected at manholes, leaky lateral connections, roots, etc. Infiltration is generally a function of groundwater levels. Groundwater levels in the service area fluctuate depending on climate and season. Infiltration rates will correspondingly change seasonally but will generally be constant during a single 24-hour period. Temporary increases in the amount of water that enters the system after a storm because of an increase in ground water will be considered as inflow (as discussed in a subsequent section).

Factors that can affect infiltration include pipe age, material, and number and condition of lateral connections. Age can contribute to infiltration in two ways. First, older pipes are more likely to be in poor condition. Cracks, separated joints, and other defects can contribute significantly to increased infiltration. Second, older pipes do not have the benefit of improvements in construction techniques that have occurred over time. Gasketed pipe joints, rubber boots at manholes and laterals, and other improvements have contributed greatly to reducing system infiltration over time.

Infiltration in the collection system was identified primarily through temporary flow monitoring conducted by Orem City personnel over a number of years. Infiltration in the collection system was identified by subtracting domestic flow developed using indoor water use records from the total average flow at flow monitors in the City. To account for seasonal fluctuations in infiltration, the highest average monthly flow over the last 5-years was used as the planning criteria for calibrating the existing condition model. Calibration of the hydraulic model is discussed in further detail in Chapter 4. The total infiltration included in the model for existing conditions is 0.94 mgd. For the City's entire collection system, this equates to approximately 356 gallons per day per inch-diameter mile. For comparison, the American Society of Civil Engineers (ASCE) recommends an allowable infiltration rate for new construction of no more than 500 gpd/in-dia/mile. This would suggest that Orem City has relatively low infiltration for its relative age. This conforms to anecdotal information reported by Orem City personnel and may be the result of the topography and soil characteristics of the Orem bench that result in relatively large depths to ground water. For projecting future infiltration, the existing City-wide infiltration rate (infiltration/domestic flow = 11.7%) was applied to future growth uniformly.



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OREM CITY
SEWER MASTER PLAN

AREAS OF POTENTIAL GROWTH

NORTH:

SCALE: 0 1,500 3,000 Feet

FIGURE NO. 3-3

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Table 3-5 shows projected domestic flows and infiltration through 2060 based on the assumptions above.

Table 3-5
Dry Weather Sewer Flow Rates (mgd)

Year	Projected Domestic Sewer Flows	Estimated Infiltration	Estimated Dry Weather Sewer Flows
2013	8.85	0.94	9.79
2020	9.99	1.10	11.09
2030	10.90	1.42	12.32
2040	11.76	1.51	13.27
2050	12.41	1.57	13.98
2060	12.99	1.63	14.62

INFLOW

The third and final component of wastewater flow that must be considered for wastewater master planning is inflow. Inflow is defined as any water that enters into the sewer system which is directly or indirectly related to a storm event. It can come directly from storm runoff through improper connections to the storm water system, missing or leaky manhole covers, roof drains connected to the system, etc. Storm events can also cause the ground water to raise temporarily, which can cause an increase in flow in the sewer system through the same mechanisms that result in groundwater infiltration during dry weather (cracked pipes, leaky laterals, etc.). Any temporary increase in sewer flow due to raising levels of ground water as a result of snowmelt or rain is considered inflow.

Figure 3-4 shows the flows at the City's wastewater treatment plant 3 days before and after a severe storm event that occurred on September 7, 2013 in Orem City. The storm caused flooding at numerous locations in the City and exceeded the 1 percent probable storm (100-year storm). Resulting inflow at the treatment plant increased flows by at least 150 percent for a short period. It is assumed that many collection system pipes were affected similarly. From this data, it is clear that the City's system does have potential for significant inflow. However, it is not possible to accurately estimate the magnitude and distribution of inflow events for individual pipes without a significant amount of flow monitor and rain gauge data. As a result, inflow has not been included directly in projected flows, but it will be important for the City to include adequate hydraulic capacity in its collection and treatment system to account for inflow events.

WATER RECLAMATION FACILITY CAPACITY

Based on the growth projections through build-out for the Orem City sewer service area, Figure 3-5 summarizes projected flow into the Orem City Water Reclamation Facility. As shown in the figure, average day capacity of the plant is not expected to be exceeded until after 2040. Peak hour sewer flows are more difficult to project because they can be significantly affected by groundwater conditions and inflow events. Based on the best available data, peak hour flows are also not expected to exceed the peak hydraulic capacity of the plant until after 2040. It is recommended

Figure 3-4
Inflow at Wastewater Treatment Plant
for September 7, 2013

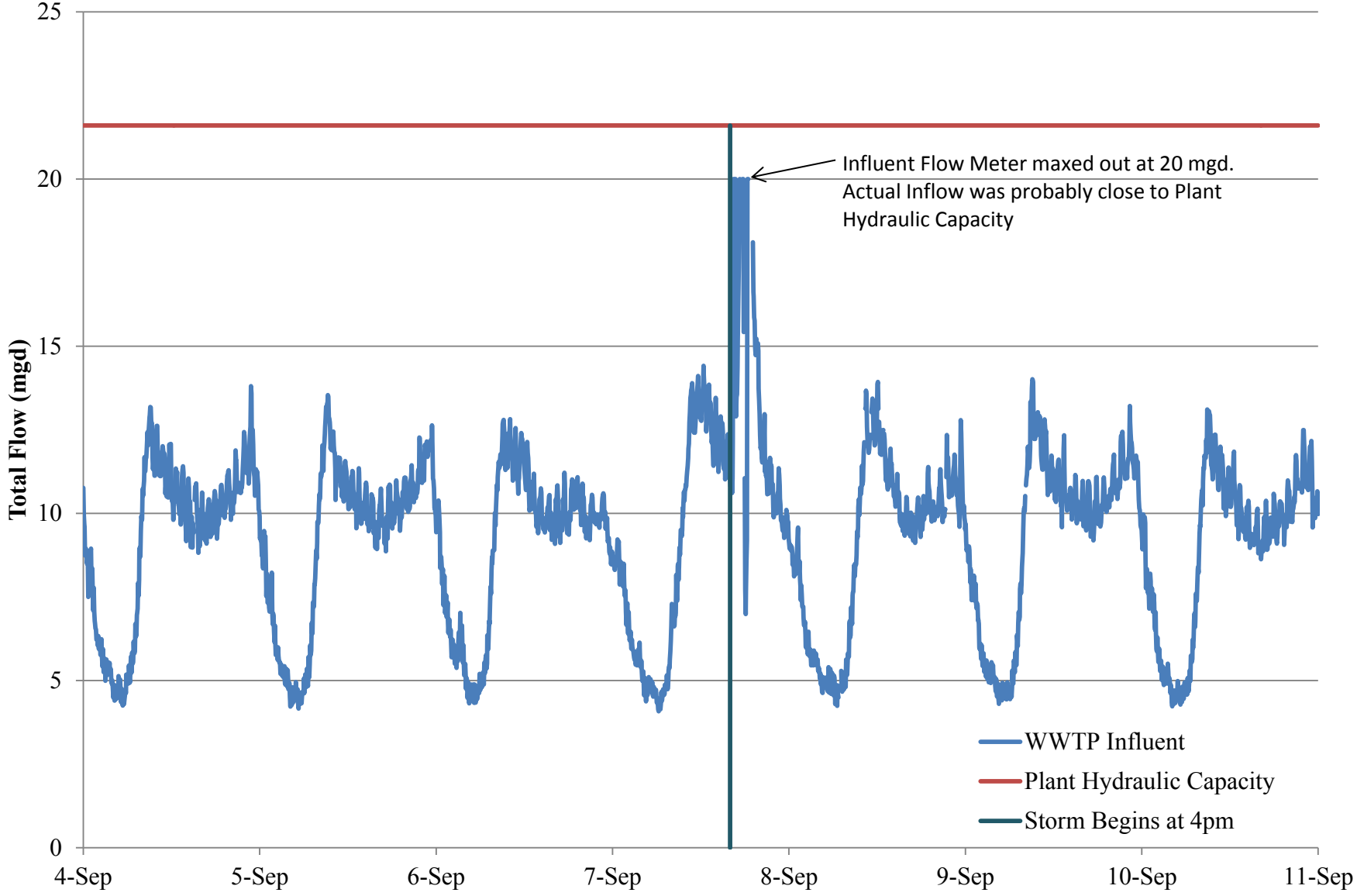
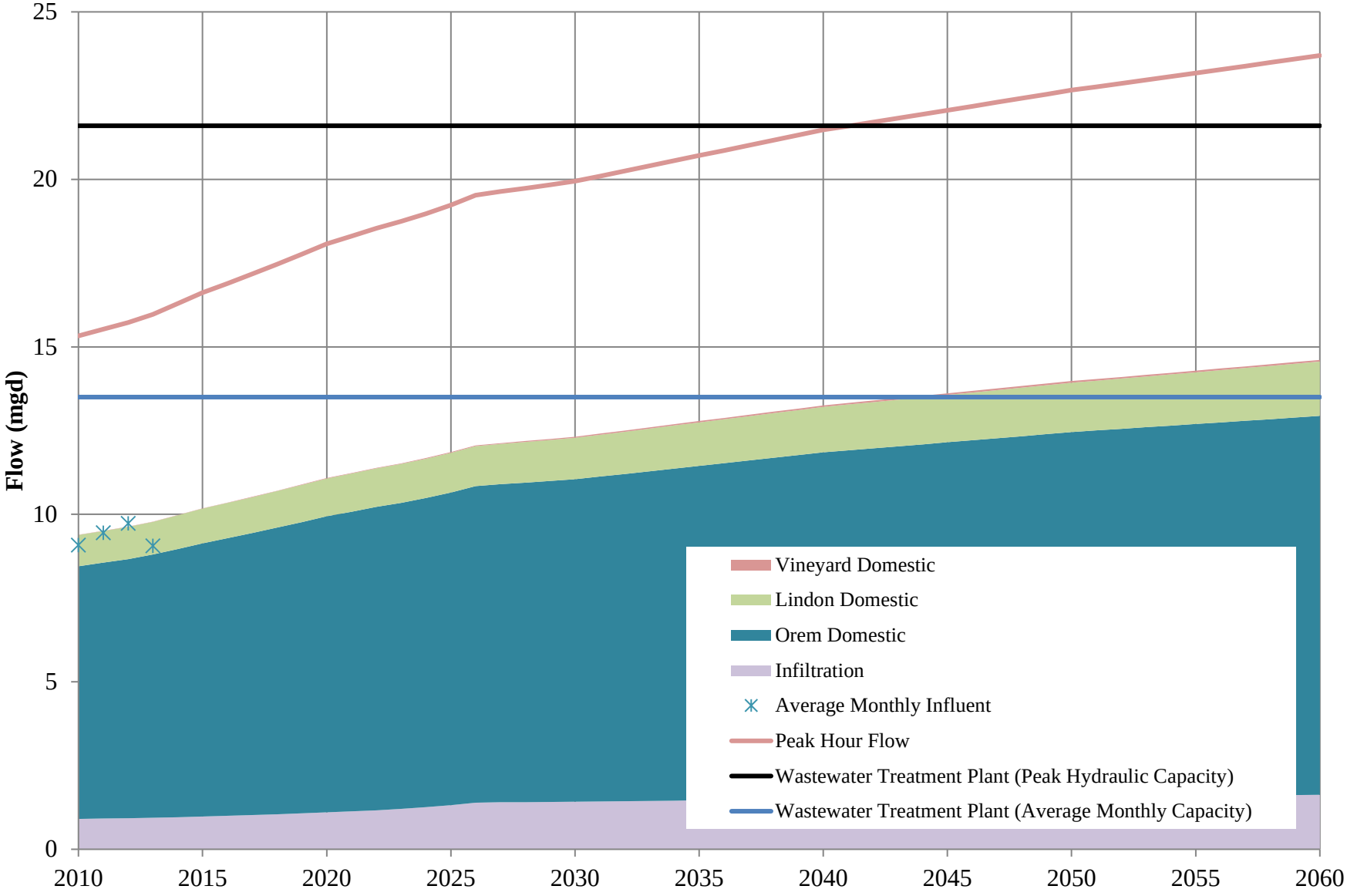


Figure 3-5
Future Wastewater Production to Orem City
Wastewater Treatment Plant



that Orem City continue to monitor and evaluate peak flows relative to plant capacity. However, based on current data, it is not expected that expansion of the plant will be an issue anytime in the near future.

CHAPTER 4
HYDRAULIC MODELING

INTRODUCTION

A critical component in identifying required areas in the Orem City collection system where pipes have capacity deficiencies is the development of a hydraulic computer model. An extended period simulation (EPS) hydraulic model was developed using Innovyze's InfoSWMM software. The purpose of this chapter is to present a summary of the methodology used to develop this model.

GEOMETRIC MODEL DATA

There are two major types of data required to develop a hydraulic model of a sewer system: geometric data and flow data. Geometric data consists of information on the location and size of system facilities including pipes, manholes, and lift stations. It also includes the physical characteristics of the facilities including pipe roughness, invert elevations at manholes, pump settings in lift stations, and a description of any diversions present. This information is generally collected from system inventory data or through direct field measurement. The following sections describe how geometric data was assembled for use in the hydraulic model.

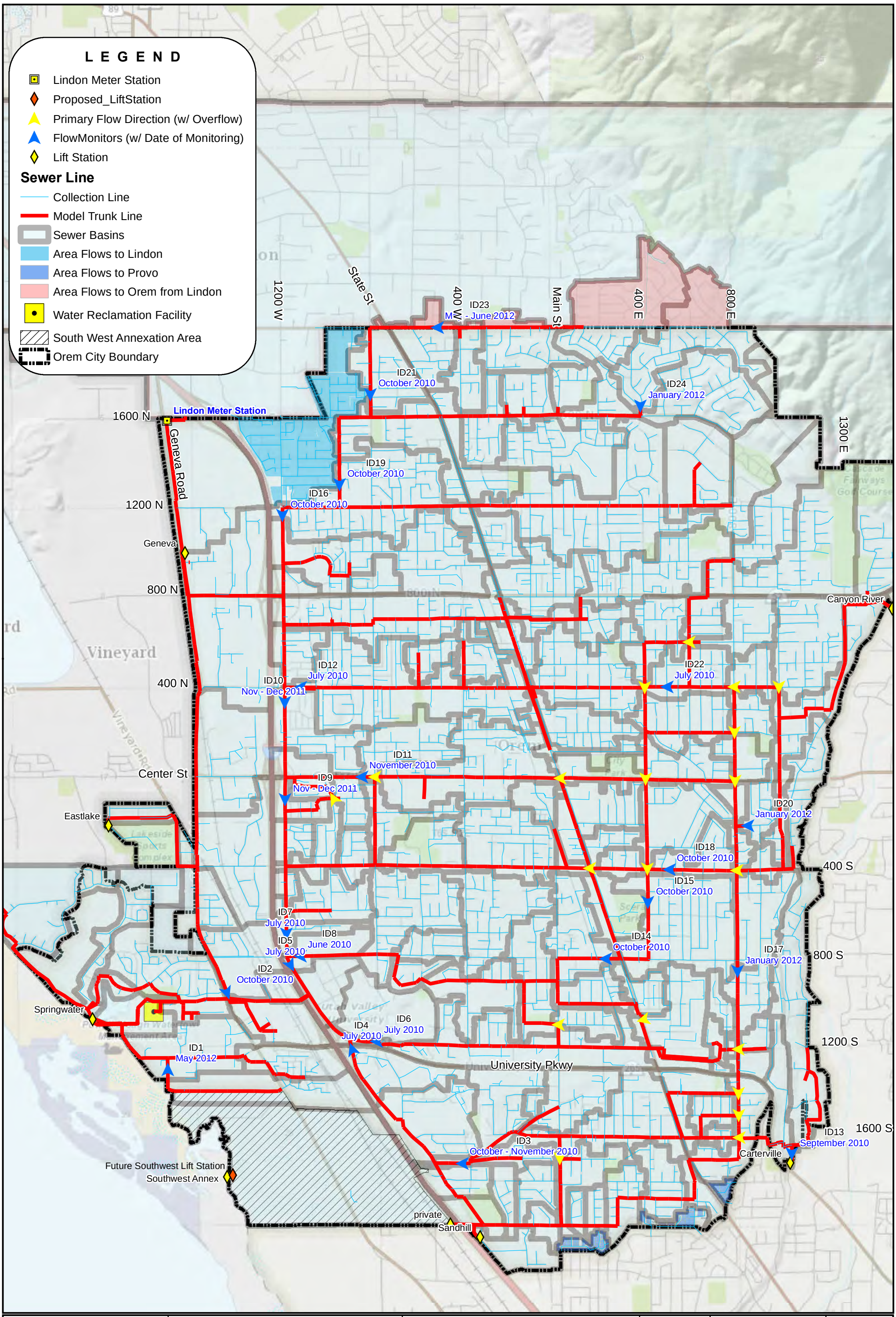
Pipeline and Manhole Locations

Orem City has spent considerable time assembling a GIS inventory of its existing sewer facilities. That database includes information on the location and size of manholes and pipelines in the Orem City collection system. Based on direction from City personnel, pipeline and manhole data was taken directly from the City's GIS database for use in the model. In some areas where manholes did not have reliable invert information, invert elevations were interpolated based on inverts upstream and downstream of areas without information. Areas with interpolated inverts have been documented in the hydraulic model.

Modeled Pipelines

It was not deemed necessary to model all of the sewer pipes in the Orem City sewer system. As smaller pipes are added to the model, the more refined the analysis becomes, but this requires additional time, effort, and expense (including higher annual software maintenance costs for hydraulic modeling). Hence, it is important to consider the required accuracy and available budget when selecting the sewer lines to model.

To optimize the level of effort, it was decided to include in the model all sewer pipes with a diameter of 10 inches or larger and 8-inch pipes serving areas greater than 200 acres as shown in Figure 4-1. As service areas decrease in relative size (less than 200 acres), State minimum slope requirements result in capacities that exceed the potential wastewater production for typical residential densities in Orem City. As a result, modeling pipes that are serving areas smaller than this size will not add any additional meaningful results to the analysis. It is possible that higher density developments may require additional 8-inch pipes to be modeled in the future.



Bowen Collins & Associates, Inc. CONSULTING ENGINEERS	OREM CITY SEWER MASTER PLAN	MODEL TRUNK LINES & FLOW MONITORS	NORTH: NORTH	SCALE: 0 1,250 2,500 Feet	FIGURE NO. 4-1

P:\Orem City\2013 Master Plans\4.0 GIS\4.1 Projects\SewerMap\Sewer-Figure 4-1 - Trunk Lines.mxd amckinnon 11/7/2014

However, for the purpose of this study, the pipes identified for modeling were considered adequate for assessing potential hydraulic deficiencies. The final selection of sewer lines included in this model was reviewed and approved by Orem City personnel.

Pipe Flow Coefficients

Pipe flow coefficients used throughout the hydraulic model were assigned a Manning's roughness coefficient of 0.013. This is approximately equal to the roughness coefficient of concrete and clay pipe. While there are other materials in the system with lower published roughness coefficients (e.g. PVC), 0.013 was used throughout the system as a conservative approach for estimating pipe capacity. In addition, most collection pipes can develop thin layers of bacteria and solids (a slime layer) that result in relatively uniform roughness coefficients despite varying materials.

Sediment and Debris

Because of the transportable nature of grease and debris in a sewer collection system, it is not possible to identify the exact location and quantity of grease or debris accumulation in the system for any specific point in time. Similarly, the build-up and erosion rates of sediment in sanitary sewer systems are not always well understood. As a result, the detailed modeling of sediment, grease, and debris on a system wide basis is not feasible because of continually changing conditions. Therefore, no sediment was included in the various runs of the hydraulic model. Instead, the design and evaluation criteria for the Orem City collection system is based on "clean" pipes, with an allowance for capacity lost to the accumulation of sediment (see Chapter 5).

It should be noted that the hydraulic modeling software used to simulate the operation of the Orem City wastewater collection system does have the ability to set sediment depth in pipes. Therefore, if the City does collect detailed sediment data for a given section of pipe, the sediment may be added to the model and its effects evaluated. However, it should be emphasized that any sediment levels defined today will change in the future as flow conditions change.

Lift Stations

Orem City has 6 lift stations in its collection system. Where pump curves were available, associated pump performance criteria were input into the model. Pump curves at other locations were estimated based on the required lift and flow capacity of the lift station as reported by City personnel.

Potential Diversion

The City has one diversion in its collection system near UVU and I-15 where flow can be diverted into a parallel sewer main underneath the freeway and railroad tracks. In addition, there are a number of manholes that have two potential flow directions based on the available invert information provided by the City. In all cases, there is a primary flow direction where all flow is conveyed under typical conditions with a potential "overflow" direction primarily used for

flushing lines and system maintenance. Table 4-1 lists the location of these potential diversions along with their primary flow directions which are also shown in Figure 4-1. These potential diversions were identified so that the hydraulic model would correctly simulate the proper flow path for wastewater through the collection system.

Table 4-1
Manholes with Potential Overflow Directions

Manhole ID	Location	Main Flow Direction
17-0171	600 E 600 North (Overflow manhole to the south. All flow goes west).	West
26-0028	400 S 400 East (Overflow manhole to the west. All flow goes south).	South
17-0063	800 E 400 North (Overflow manhole to the south. All flow goes west).	West
17-0072	1000 E 400 North (Overflow manhole to the west. All flow goes south).	South
17-0089	200 N 800 East (Overflow manhole to the west. All flow goes south).	South
19-0086	1000 W 100 South (Overflow manhole to the west. All flow goes northwest).	Northwest
20-0173	800 W Center Street (Overflow manhole to the south. All flow goes west).	West
21-0136	400 E Center Street West (Overflow manhole to the west. All flow goes south).	South
21-0164	Center Street & State Street (Overflow manhole to the south. All flow goes west).	West
26-0154	400 S State Street West (Overflow manhole to the south. All flow goes west).	West
27-0033	800 E 400 South (Overflow manhole to the south. All flow goes west).	West
31-0028	1100 S Main Street (Overflow manhole to the south. All flow goes west).	West
31-0124	1070 S State Street (Overflow manhole to the north. All flow goes west).	West
32-0026	1200 S 800 East (Overflow manhole to the south. All flow goes west).	West
34-0110	1700 S Main Street (This is an overflow manhole to the North. All the flow goes to the south).	South
35-0021	1600 S 800 East (Overflow manhole to the south. All flow goes west).	West
35-0024	1500 S 800 East (Overflow manhole to the west. All flow goes south).	South
35-0026	1400 S 800 East (Overflow manhole to the west. All flow goes south).	South
22-0093	800 E Center St (Overflow manhole to the west. All flow goes south).	South
16-0139	400 North 400 E. (Overflow manhole to the west. All flow goes south).	South

FLOW DATA

Once all required geometric data was collected and a physical model of the system was developed, flow data was obtained to model the system hydraulics. Three types of flow information were required for hydraulic modeling: total magnitude of flow, timing of flow, and distribution of flow across the City service area. Each of these flow characteristics is discussed below.

Total Flow

Flow projections for the Orem City service area were presented in detail in Chapter 3. Total flow for modeling scenarios examined here are summarized in Table 4-2.

Table 4-2
Hydraulic Modeling Scenario Total Daily Flow Volumes (mgd)

Scenario	Existing	2060
Dry Weather Flow/Infiltration	9.79	14.62

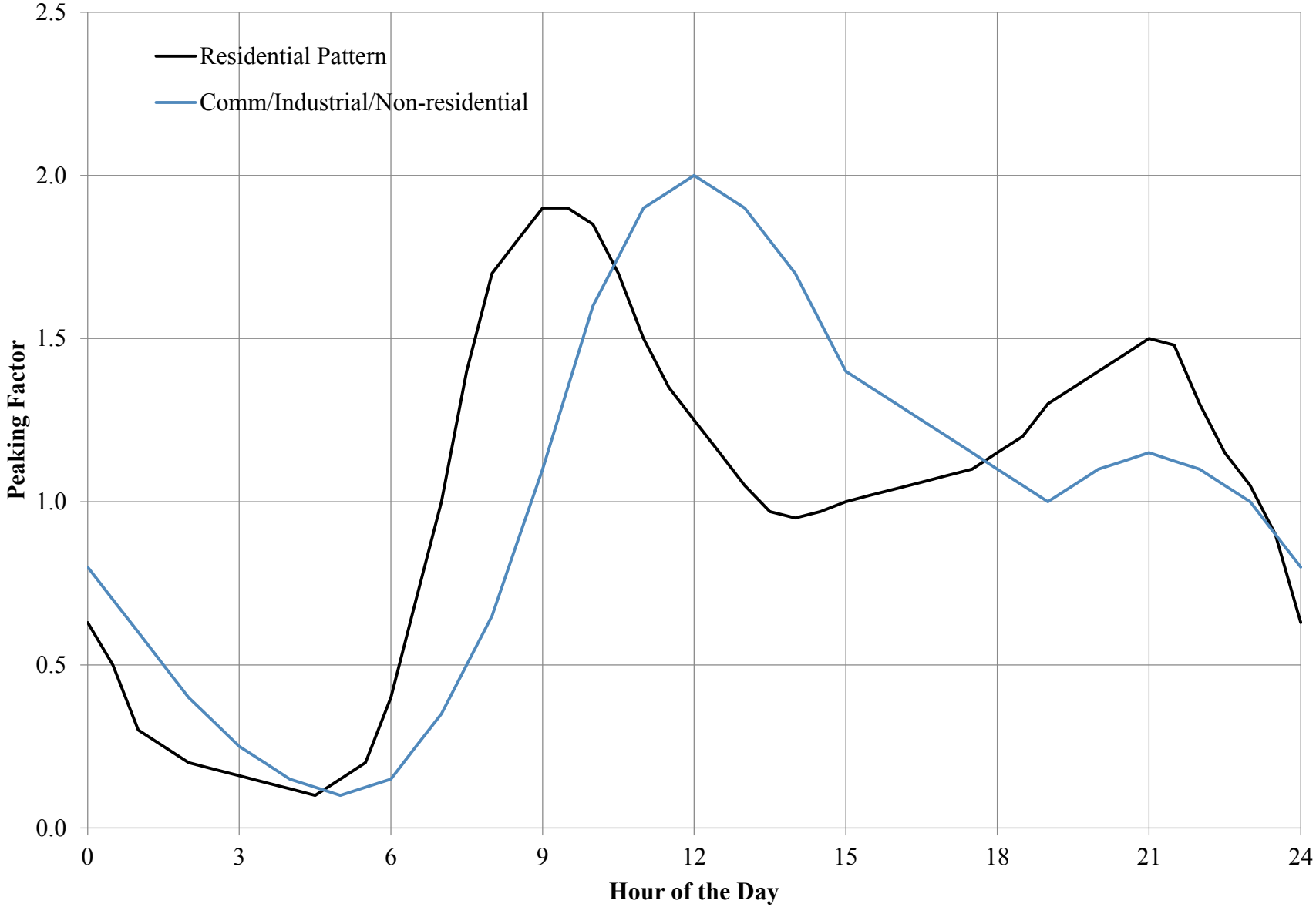
Timing of Flow

It will be noted that the volumes shown in Table 4-2 represent total flow over a 24-hour period. Since sanitary sewer flows vary throughout the day with varying indoor water demands, of much greater importance for the purposes of modeling collection system capacity is the calculation of peak flows that occur during the day. To predict the magnitude and timing of peak flows in the model, it is important to understand how flow varies throughout the day. This is different for each component of wastewater flow.

Domestic Wastewater – The pattern of fluctuating domestic water use is often referred to as a diurnal pattern. These patterns vary depending on the type of user. For example, the typical diurnal pattern for residential weekday wastewater production is shown in Figure 4-2. This figure was developed by dividing measured flows from predominantly residential neighborhoods by each neighborhood's average daily flow, essentially normalizing flow measurements so they can be compared against each other. As can be seen in the figure, peak residential wastewater production typically occurs around 9 a.m. as residents prepare for the work day, with a smaller peak occurring around 9 p.m. as residents clean up and prepare for bed. The average residential pattern shown in Figure 4-2 is the pattern used in the hydraulic model to predict flow for "residential" sewer flows. Figure 4-2 also includes a commercial/industrial diurnal pattern. While industrial flow patterns will largely be dependent on the type of industry, no flow monitoring data was available that could identify a strictly industrial flow pattern in the City. The commercial/industrial pattern shown in Figure 4-2 was developed using flow monitoring on Geneva Road near University Parkway.

Infiltration – As discussed in Chapter 3, infiltration may vary on a seasonal basis but does not generally vary on a daily basis. Thus, it has been assumed that infiltration remains constant throughout the day in the collection system model.

Figure 4-2
Diurnal Patterns in Orem City



Inflow – For this study, inflow has not been modeled directly because of the wide variability in storm events and inflow response possible in the City. For design purposes, Orem City has included a capacity allowance in its design criteria to account for inflow into its collection system.

Table 4-3 shows the peaking factors used for each hour that represent the patterns used in the hydraulic model.

Table 4-3
Hydraulic Model Diurnal Patterns

Hour	Residential	Commercial
0	0.63	0.8
1	0.3	0.6
2	0.2	0.4
3	0.16	0.25
4	0.12	0.15
5	0.15	0.1
6	0.4	0.15
7	1	0.35
8	1.7	0.65
9	1.9	1.1
10	1.85	1.6
11	1.5	1.9
12	1.25	2
13	1.07	1.9
14	0.95	1.7
15	1	1.4
16	1.04	1.3
17	1.08	1.2
18	1.15	1.1
19	1.3	1
20	1.4	1.1
21	1.5	1.15
22	1.3	1.1
23	1.05	1
24	0.63	0.8

Based on the diurnal patterns used above, peak flows simulated in the model are summarized in Table 4-4.

Table 4-4
Hydraulic Modeling Scenario Peak Hour Flows* (mgd)

Scenario	Existing	2060
Dry Weather Flow	17.02	24.92

*Peak hour WWTP inflow from extended period simulation which accounts for attenuation in the collection system.

Distribution of Flow

With flow magnitude and timing estimated, the final step in developing flow data for the model is distributing it spatially across the City:

Domestic Wastewater – Existing domestic sewer flows included in the hydraulic model were distributed based on winter water use data. Winter water meter data collected across the City was assigned to the nearest manhole assuming that the sewer connections from the various water meters would flow to the same manhole. Metered demands which have some inherent inaccuracies with underreporting were factored up to match the estimated domestic production for the City as measured at the City's wastewater treatment plant. Future growth of domestic sewer flow was distributed in the same manner based on growth as projected by TAZ (described in Chapter 3).

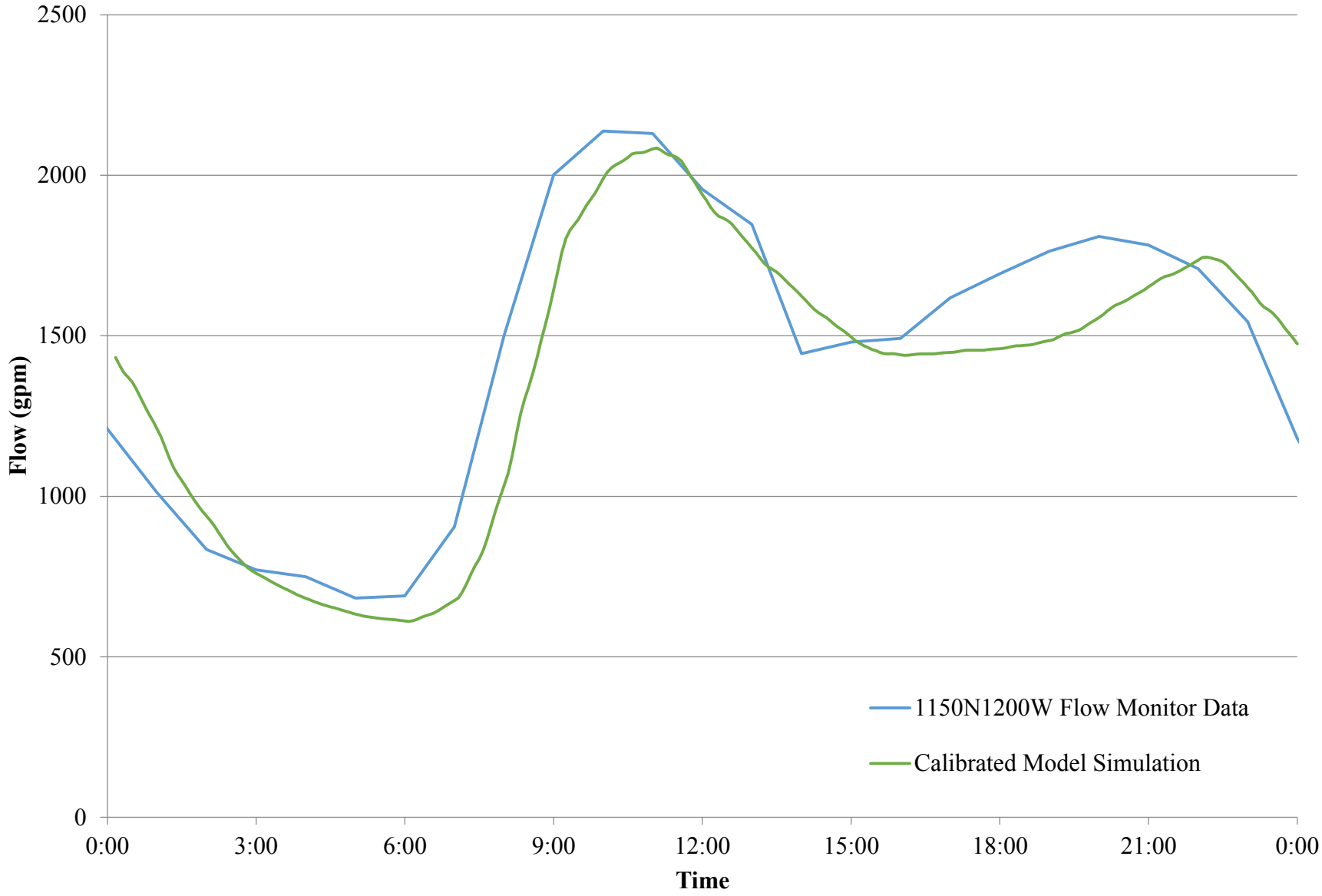
Infiltration – Existing infiltration was distributed using flow monitoring data collected by Orem City. Because infiltration likely varied significantly over the wide range of dates when flow monitoring was collected, each flow monitoring site was compared to treatment plant data for the period of collection and a seasonally adjusted estimate of infiltration was developed for each flow monitoring site. The seasonally adjusted estimate was then distributed into the tributary area for the flow monitor sites.

CALIBRATION

The process of model calibration involves adjusting or modifying certain model parameters in order to better match the actual conditions of the sewer system. Calibration of the model was performed using available historical flow meter data from various locations throughout Orem City. A comparison of model results against the historic flow monitoring results appears to indicate that, in general, the model is reproducing system conditions within a reasonable level of accuracy. However, model adjustments were made where possible in order to better match the historic monitoring results. Final results for one sample flow monitoring location are shown in Figure 4-3. As is the case with all model results of this type, model results produce a slightly smoother curve than the actual flow monitoring results.

It should be understood that the hydraulic model developed for this study relies on the available geometric and flow monitoring data provided by Orem City. As additional pipelines are surveyed or new flow measurement data is collected, the hydraulic model should be updated and recalibrated to reflect the updated conditions. Orem City should continue to update this hydraulic model based on new survey information at least once a year to ensure it reflects current conditions.

Figure 4-3
Simulated Model Results vs Observed Flow at Sample Flow Monitor (ID16)



CHAPTER 5
SYSTEM EVALUATION

With the development and calibration of a hydraulic sewer model, it is possible to simulate sewer system operating conditions for both present and future conditions. The purpose of this chapter is to evaluate hydraulic performance of the collection system and identify potential hydraulic deficiencies.

EVALUATION CRITERIA

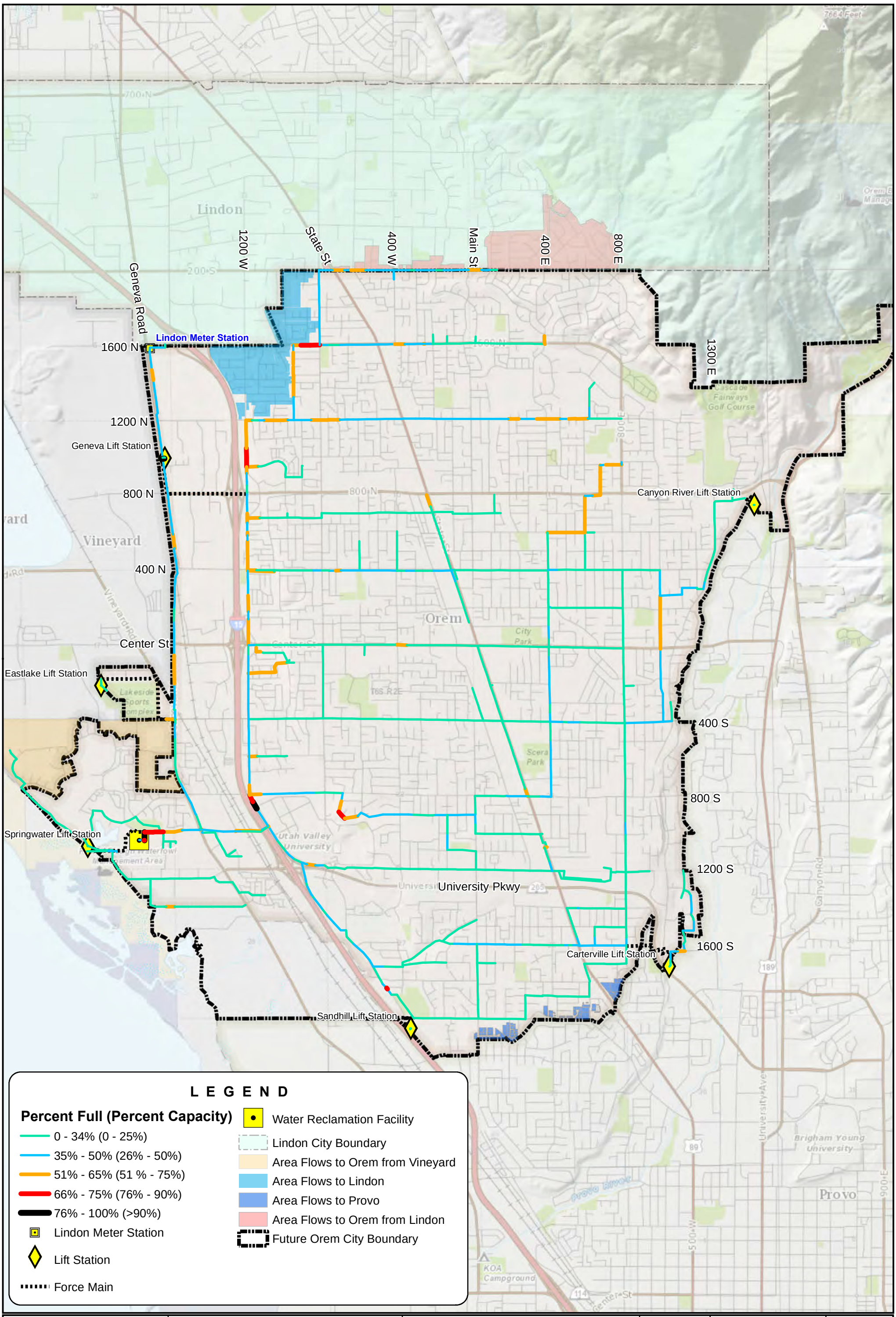
In defining what constitutes a hydraulic deficiency, it is important to consider the assumptions made in estimating sewer flows in the model. As described in Chapters 3 and 4, the sewer flow included in the model is composed of two parts: domestic sewer flow and infiltration. This means that the model represents dry weather conditions only and does not include wastewater flows associated with inflow. Additionally, estimates of domestic wastewater flows and infiltration are based on available historic data. Because these estimates are based on average values and a limited data set, actual flows will fluctuate and may be greater than the model estimates. For example, infiltration during extremely wet years could be more than estimated in the model (e.g. 1983 was a statewide historically wet year that led to high infiltration and flooding in many areas, but this year is outside the historical flow records available at the plant). The criteria established for identifying deficiencies should be sufficiently conservative to account for inflow in the system and occasional domestic and infiltration flows higher than those estimated in the model. The following criteria have been established to identify capacity deficiencies in the system:

- **Pipeline Capacity –** The most important deficiency to eliminate in the sewer system is inadequate capacity. For this master plan, it was decided to define a capacity deficiency as any point where the dry weather peak hour flow in the pipe is greater than 75 percent of the pipe's full flow capacity, which occurs when flow exceeds a depth of approximately 65 percent of the pipe's diameter. The remaining 25 percent of pipe hydraulic capacity was reserved for inflow and/or unaccounted for fluctuations in domestic flow and infiltration. In cases where short segments of relatively flat pipes exist, a maximum allowable depth of 65 percent of pipe diameter is used to define a pipe deficiency. A manning's roughness value of 0.013 was used for all collection pipes to conservatively calculate capacity.

- **Lift Station Capacity –** A lift station capacity deficiency is defined as anytime dry weather peak hour flows exceed 85 percent of the lift station's primary pumping capacity. This criterion is a little less conservative that the capacity criterion for pipeline because all lift stations are required to have at least one backup pump in case of mechanical failure or significant inflow from wet weather events. Lift stations also have storage wet wells that can accommodate higher than expected flows for short durations.

EXISTING SYSTEM ANALYSIS

Figure 5-1 displays the hydraulic capacity of the sewer system under existing peak hour flow conditions. Pipes in the figure are color coded to show the ratio of maximum depth in the pipe to



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OREM CITY
SEWER MASTER PLAN

PEAK FLOW TO CAPACITY FOR EXISTING CONDITIONS

NORTH:

SCALE: 0 1,500 3,000 Feet

FIGURE NO. 5-1

P:\Orem City\2013 Master Plans\4.0 GIS\4.1 Projects\SewerMap\Sewer-Figure 5-1 - Existing Capacity.mxd aanderson 10/27/2014

the pipe's full depth. Based on peak flow and pipe capacities alone, there are a few isolated deficiencies scattered throughout the system. These deficiencies are generally due to pipes being laid on a flat slope, which decreases the full flow capacity.

Short sections of flat pipe often do not represent a significant operational or maintenance issue for the system. The results shown in Figure 5-1 represent the maximum flow depth at any point along the length of the pipe. As long as the neighboring pipes have sufficient capacity, the extra depth caused by the flat slope will not result in surcharging problems for the system. Deficiencies observed in the existing system do not appear to pose a significant surcharge risk at this time, but will require monitoring as sewer flows continue to increase. No lift station deficiencies were observed in the existing sewer system.

Carterville Lift Station Infiltration

In general, Orem City has relatively low infiltration rates from groundwater intrusion into sewer collection pipes. The Carterville Lift Station service area appears to be a possible exception to these relatively low infiltration rates. Initial comparisons of metered water use and measured flows through the Carterville Lift Station indicate that a significant portion of flow is attributable to infiltration. Because this amount of infiltration seems unreasonably high, it is possible that there are errors in either the metered water usage for the homes which flow to the lift station or the flow measurement performed on the lift station itself. This considered, it is recommended that the City carry out additional flow monitoring tests both upstream and downstream of the lift station to determine if excessive infiltration is fact an issue that needs to be addressed.

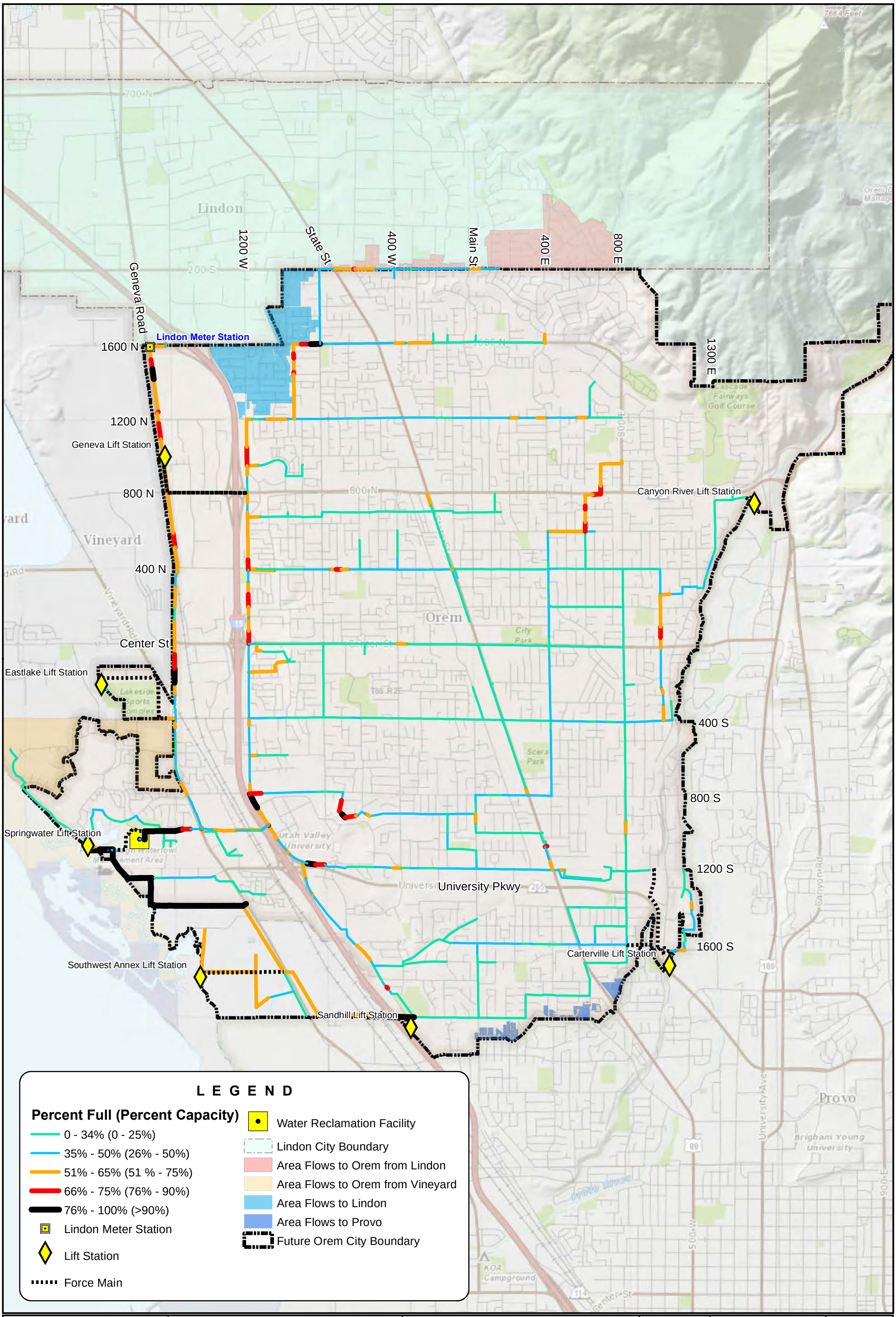
No pipe capacity deficiencies were identified as a result of what has been identified as potentially excessive infiltration at the Carterville Lift Station. However, this represents an area where Orem City could potentially reduce operation and maintenance costs if infiltration is indeed confirmed to exist at the Carterville lift station and can be reduced through sewer line rehabilitation projects.

FUTURE SYSTEM ANALYSIS

Figure 5-2 shows the hydraulic performance as calculated by the hydraulic model for sewer flows at projected conditions in 2060 if no improvements are made to the existing system. These results assume that sewer flows associated with future development will flow to the nearest manhole in the existing system. While the majority of the system under 2060 conditions has ample capacity, some significant deficiencies have been observed in the model results.

Pipeline Deficiencies

As shown in Figure 5-2, model results for the sewer collection system at 2060 show isolated pipeline capacity deficiencies which are mostly a result of pipes laid with shallow slopes. Only some of these simulated deficiencies require an improvement project as discussed below.



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OREM CITY
SEWER MASTER PLAN

PEAK FLOW TO CAPACITY FOR BUILDOUT CONDITIONS

NORTH:

SCALE: 0 1,500 3,000 Feet

FIGURE NO. 5-2

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1600 North 800 West

Model simulations have indicated that a growth related deficiency will occur in a segment of pipe on 1600 North, downstream of the intersection of 1600 North and 800 West. Based on the current projections and distribution of flows in the model, it is anticipated that this section of pipe will become deficient by approximately the year 2030. This timing is subject to change based on the actual growth patterns in future years.

College Drive/1200 West at 800 South

The section of pipe downstream of the manhole at 1200 West and 800 South is projected to become deficient within the next 6-8 years. GIS data for manhole inverts provided by Orem City indicate an adverse slope in a portion of this deficient pipe. This could be an error in the survey data, and it is recommended that the invert elevations be verified before finalizing any plans for a capital project.

925 South 725 West

Hydraulic model results indicate a potentially deficient section of pipe along 925 South and 725 West. It is estimated that this length of pipe will exceed its available capacity by the year 2030.

Chambery Collection Line

The existing sewer line which conveys wastewater from the Chambery housing development to the Springwater Lift Station is expected to see a significant increase in flow as a result of projected development. Future model results indicate that there will be capacity deficiencies along the entire reach of pipe from Chambery to the Springwater Lift Station. Depending on growth in the area, it is estimated that the available capacity in this pipe will be exceeded within the next 5-10 years.

College Drive near 1200 South

Orem City would like to relocate the outfall of the Carterville Lift Station to 1200 South because of aging infrastructure and concerns about the existing force main's location under University Parkway and between existing homes. As a result of this relocation, a deficiency has been projected at buildout in the pipe along College Drive near University Parkway and I-15. This deficiency appears to be the result of a transition from a steep slope to a flat slope as the 12 inch line runs into the large transmission line near 1-15 and University Parkway. This location will primarily be a concern for surcharging under wet weather conditions.

Lift Station Deficiencies

Table 5-1 summarizes the projected 2060 flow to the lift stations in Orem City.

Table 5-1
Summary of Sewer Lift Stations

Name	Capacity (gpm)	Existing Dry Weather Peak Flow (gpm)	2060 Dry Weather Peak Flow (gpm)*
Carterville Lift Station	500	220	250
Geneva Lift Station	1,987	790	***2,540***
Springwater Lift Station	850	180	***1,320***
Eastlake Lift Station	300	20	70
Canyon River Lift Station	300	2	3
Sandhill Lift Station	300	10	40

*italicized bold text indicates a deficiency.

Geneva Road Lift Station

Primarily due to growth from Lindon City, 2060 model results indicate future deficiencies in the Geneva Lift Station. The lift station at Geneva Road and 800 North is currently equipped with 4 pumps. The pumps include a primary and backup 10 horsepower pump with a capacity of 800 gpm (833 gpm @ 22') that discharges into Geneva Road. When peak flows exceed the capacity of these pumps (such as under wet weather conditions), excess flow can be pumped through a primary and backup 75 horsepower pump with a capacity of 1,190 gpm that discharge to 1200 West. The current combined capacity of Geneva Lift Station is 1,990 gpm. At buildout, peak hour flows are predicted to reach approximately 2,540 gpm, exceeding the current pumping capacity of the lift station. However, the force mains to Geneva Road and 1200 West will have sufficient capacity at buildout. Therefore, it should be possible to achieve the needed capacity at the Geneva Road Lift Station through a relatively inexpensive upgrade to the lift station pumps.

Springwater Lift Station

The Springwater Lift Station has two challenges. First, as a result of projected development, flow routed through the Springwater Lift Station is expected to increase substantially. The primary and backup pump at the Springwater Lift Station are 20 horsepower with a capacity of 850 gpm. With predicted peak hour flows reaching as high as 1,320 gpm, the Springwater Lift Station will require a significant pump upgrade. A second challenge at the lift station is its condition. Orem City personnel have indicated that the lift station and force main are both approaching the end of their service life and need to be replaced in order to meet the needs of existing and future users. As a result, replacement of this lift station will be a high priority for the City.

Orem City Water Reclamation Facility

WRF Inlet

Model results for the sewer system under existing flows indicate capacity issues in a couple of sections of the large inlet pipe to the WRF. These deficiencies currently do not appear to create

the potential for surcharging. However, as can be seen in Figure 5-2, the model simulation results at 2060 suggest that the deficiencies will spread to other connected sections of pipe, extending east from the WRF outfall toward East Shore High School. Building additional capacity through this portion of the system will be required at some point in the future.

Plant Capacity

Growth projections in the Orem City sewer service area are predicted to produce flows into the WRF which could exceed both the average monthly capacity and peak flow capacity of the plant (see Chap. 3, Figure 3-5). However, existing capacity appears to be adequate through at least 2040 and no immediate capacity needs at the plant have been identified. It should be noted that these predictions are based on existing patterns of wastewater flow. It is recommended that the City carry out a more extensive evaluation of plant capacity in the years to come to better identify the timing of any potential expansion improvements at the WRF.

CHAPTER 6
SYSTEM IMPROVEMENTS

The hydraulic model results have identified potential deficiencies in the sewer system under existing and future conditions. This chapter covers system improvements intended to solve deficiencies as the City continues to grow. Once the detailed design of sewer facilities commences, the design capacity of these pipelines or lift stations should be based on projected build-out flows. Improvements are organized in this chapter by type and location of improvement. The priority of each project has been based on the predicted timing of when the improvement will be needed.

COLLECTION SYSTEM CAPACITY IMPROVEMENTS

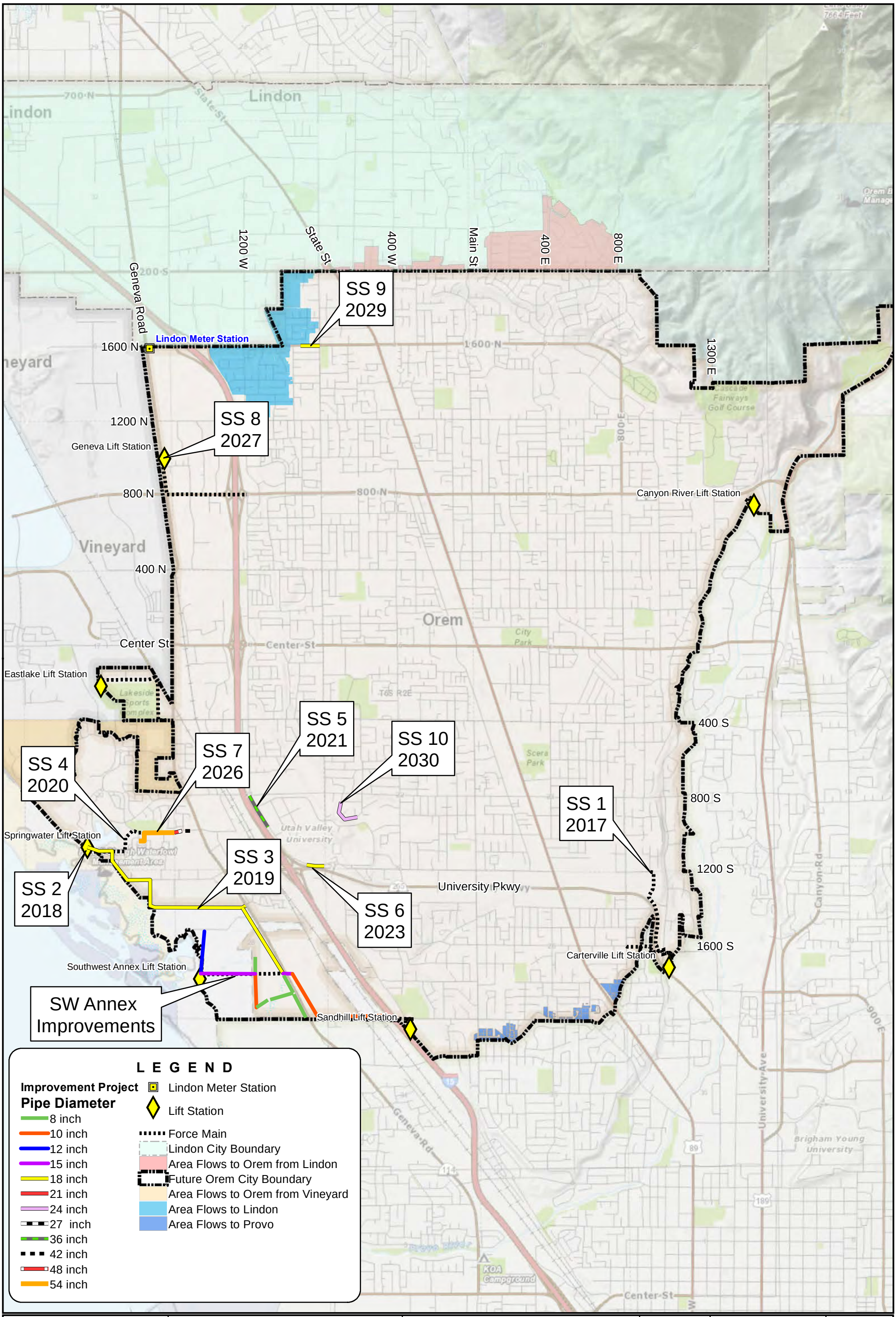
A number of collection system improvements have been identified to resolve hydraulic deficiencies related to existing or projected sewer flows as shown in Figure 6-1. Many of these projects are not needed for many years. All of the projects, regardless of timing, are discussed below and have been shown in the figure.

SS 1. Carterville Force Main Relocation

Although there do not appear to be any pipe capacity deficiencies in the Carterville Lift Station service area as a result of future growth, there are some age related deficiencies that require attention. The current alignment of the Carterville force main goes north out of the lift station then west under University Parkway. The line passes underneath several residential properties and ties into the collection system at 800 East and 1600 South. The line is also relatively old and the City is concerned with the condition of the pipe. In order to avoid potential problems with this line, Orem City has expressed the desire to abandon the existing pipe and relocate it to 925 East 1200 South, running the new line north along the east side of University Parkway and along 1000 East. Another viable outfall location for the force main was evaluated at University Parkway and 800 East. The City will have the option during design to select whichever location best suites the needs of the system.

SS 2. Springwater Lift Station

The Springwater Lift Station is in extremely poor condition and is quickly approaching the end of its useful life. As a result, replacement of the lift station is needed in the very near future. When the lift station is replaced, expansion of the lift station is also needed to accommodate projected future growth. The Springwater Lift Station is currently equipped with primary and backup 20 horsepower, 850 gpm pumps. While this provides more than enough capacity for existing flows, peak hour flows through the lift station are estimated to reach 1,320 gpm in the future. In order to accommodate the increase in flow, it is recommended that the Springwater Lift station be upgraded with 2 larger capacity pumps (1 primary and 1 backup) with a capacity of at least 1,575 gpm. This will allow the lift station to operate at or below 85% capacity at peak hour flows.



Bowen Collins & Associates, Inc. CONSULTING ENGINEERS	OREM CITY SEWER MASTER PLAN	FUTURE SYSTEM IMPROVEMENTS	NORTH: NORTH	SCALE: 0 1,500 3,000 Feet	FIGURE NO. 6-1

P:\Orem City\2013 Master Plans\4.0 GIS\4.1 Projects\SewerMap\Sewer-Figure 6-1 - System Improvements.mxd aanderson 2/17/2016

SS 3. 1400 South, Chambery to Springwater Lift Station

The capacity of the existing 10-inch line which runs along 1400 South will be exceeded as a result of increased flow from new development. In order to convey the total flow for this service area, additional capacity must be provided. Replacing the existing line with a new 18-inch sewer main will provide the necessary capacity through build-out. Orem City GIS data indicates that the existing sewer conduit just upstream of the Springwater Lift Station crosses underneath an existing pond. It is recommended that the City verify the alignment of this section of pipe and analyze the ability to replace it.

SS 4. Springwater Force Main

Model results for build-out sewer flows in Orem City indicate that peak hour flows through the existing 10-inch Springwater force main may exceed the recommended maximum velocity of 7 feet per second at buildout. In a pumped system, high velocities cause excessive head leading to high operating costs and can pose a high risk for transient damage after power failures. In order to reduce peak hour flow velocities while also maintaining minimum velocities through the sewer line, it is recommended to install a new parallel 6-inch force main from the lift station to the outfall near the Water Reclamation Facility.

SS 5. College Drive/1200 West and 800 South

As shown in Figures 5-1 and 5-2, the 550 foot section of pipe on College Drive downstream of the intersection of 1200 West and 800 South is shown as deficient under both existing and future flows. The primary factor contributing to this deficiency is an adverse slope caused by a low point at the manhole invert approximately 275 feet downstream from the manhole at 1200 West and 800 South. It is recommended that the elevation of the inverts along this alignment be resurveyed and checked against the existing Orem City GIS data.

If current model results are accurate, it is recommended that 1,260 feet of 30-inch and 33-inch line be replaced with 36-inch line. However, this pipe should be surveyed and model results updated prior to beginning this capital project.

SS 6. College Drive near 1200 South

As a result of future growth in Orem City, a deficiency is projected under buildout conditions in the 12-inch sewer conduit on College Dr. and 1200 South on the east side of I-15. The recommended improvement for this section of pipe is to replace 820 feet of 12-inch pipe with new 15- or 18-inch pipe. Surcharge concerns at this location will primarily be a concern under wet weather conditions. Because there are no nearby connections, some surcharging at this location may not pose any significant concern. These pipes should be monitored after the first phase of redevelopment at the University Mall to verify that this project is needed. This improvement project is covered in more detail in a technical memorandum regarding development at the University Mall attached as an appendix to this report.

SS 7. 1000 South/Orem Water Reclamation Facility

By 2060, wastewater flow through the pipe on 1000 South leading to the treatment plant will exceed 75 percent of the pipe's hydraulic capacity. The deficient section of pipe starts in the 36-inch section near East Shore High School and continues east to the WRF. One option to eliminate this deficiency is to replace approximately 275 feet of the existing 36-inch pipe with 42-inch pipe, and replace the remaining length of 36-inch/42-inch pipe with a 48-inch/54-inch pipe. Depending on the age and condition of the existing pipe, this option may or may not be cost effective. Another option is to construct a parallel sewer main which would take any flow which exceeds the capacity of the main sewer trunk line.

SS 8. Geneva Lift Station Pump Upgrade

To accommodate build-out flows, particularly from Lindon City, the lift station on Geneva Road at 1000 North will require a capacity upgrade. The Geneva lift station is currently equipped with 4 pumps; a primary and backup 10 horsepower 833 gpm pump and a primary and backup 75 horsepower 1,187 gpm pump. Flow into the lift station up to 833 gpm is routed to Geneva Road through the 10 horsepower pump(s). Any remaining flow is taken by the 75 horsepower pump and sent through a force main to 1200 West. Because the line on 1200 West has more capacity than the line on Geneva Road, it is recommended to upgrade the larger pumps and send the increase in flow due to growth to 1200 West. Upgrading the capacity of the larger pumps from 1,187 gpm to 2,200 gpm would provide sufficient lift station capacity through buildout. It should be noted that the existing lift station building was designed with future expansion in mind. As a result, upsizing of the pumps at this location should be able to be accomplished relatively inexpensively.

SS 9. 1600 North 800 West

At the intersection of 1600 North and 800 West, the existing sewer system consists of a 15-inch pipe on 800 West (north of the intersection) and a 15-inch pipe on 1600 North (east of the intersection) combining into a 15-inch pipe which flows west from the junction. Model results show a capacity deficiency in the section of pipe downstream of the intersection. Replacing 950 feet of 15-inch pipe with new 18-inch pipe would provide the necessary capacity to convey peak hour flows while maintaining surplus capacity for inflow events.

SS 10. 925 South 725 West

A 1,200-foot section of the existing 21-inch pipe along 925 South starting at 725 West is projected to have a capacity deficiency under peak hour build-out flows. Replacing this pipe with a new 24-inch pipe will provide adequate capacity for sewer flows through buildout.

Southwest Annexation Area

One of the largest areas of future growth in Orem is the Southwest Annexation area. It is estimated that the annex will approach full build-out by 2027. In order to convey wastewater flows to the nearby Water Reclamation Facility, Orem City has proposed the installation of

approximately 18,500 feet of new sewer pipe and a new lift station located at the west end of the annex. The main transmission line will run along Geneva Road and tie into the existing sewer system at Geneva Road near Chambery Woods. For reference, these improvements have been shown on Figure 6-1. However, it should be noted that these improvements will all be built and paid for by developers in the area. As a result, none of these projects are included in this master plan.

OTHER COLLECTION SYSTEM IMPROVEMENTS

In addition to the capacity related projects identified in the master plan model, Orem City has compiled a list of additional condition related collection system improvements which are to be constructed within the next 15 years. Table 6-1 contains a summary of these projects.

Table 6-1
Additional Condition Related Collection System Projects

Project Description	Estimated Cost (2014 Dollars)
675 N. 1060 W. to 1200 W. – H2S Concern	$29,500
1720 S. 400 W. to Sand Hill Rd. – H2S Concern	$41,500
Eastwood Street – Replacement Project	$200,000
Westwood Street – Replacement Project	$250,000
Total	**$521,000**

This does not represent a comprehensive list of all condition related system needs, but is intended to highlight the most pressing needs. Additional rehabilitation and replacement needs are discussed in Chapter 7.

WATER RECLAMATION FACILITY IMPROVEMENTS

A comprehensive evaluation of the City's reclamation facility was not included in the scope of this master plan. However, Orem City has identified a series of Water Reclamation Facility improvement projects that they would like to include in the capital facilities plan. Table 6-2 provides a summary of these projects. Among the projects identified is "Struvite Elimination". A technical memorandum documenting issues with Struvite at the reclamation facility along with recommendations is included in Appendix B.

Table 6-2
Orem City Water Reclamation Facility CIP Projects

Project Description	Estimated Cost (2014 Dollars)
Replace headworks bar screens	$400,000
Replace grit washer	$200,000
Third press in solids handling	$500,000
Struvite elimination	$1,600,000
Concrete/membrane existing lagoons	$500,000
Replace back-up generator	$500,000
Replace existing solids presses	$1,000,000
Upgrade/expansion of aeration/grit basin on the headworks facility	$800,000
Sludge disposal options - solar, central county treatment disposal site	$5,000,000
Co-generation technology	$1,000,000
Total	**$11,500,000**

CHAPTER 7
CAPITAL IMPROVEMENT PLAN

Previous chapters of this report have identified improvements to resolve existing deficiencies and to accommodate wastewater flow from future growth. Providing an acceptable level of service requires consistent and continual system monitoring and evaluation, with updates being made when necessary. The purpose of this chapter is to assemble a 10-year capital improvement program to implement the recommended improvements. This will include recommendations regarding levels of funding for system rehabilitation, replacement, and capital improvement projects.

SYSTEM REHABILITATION AND REPLACEMENT

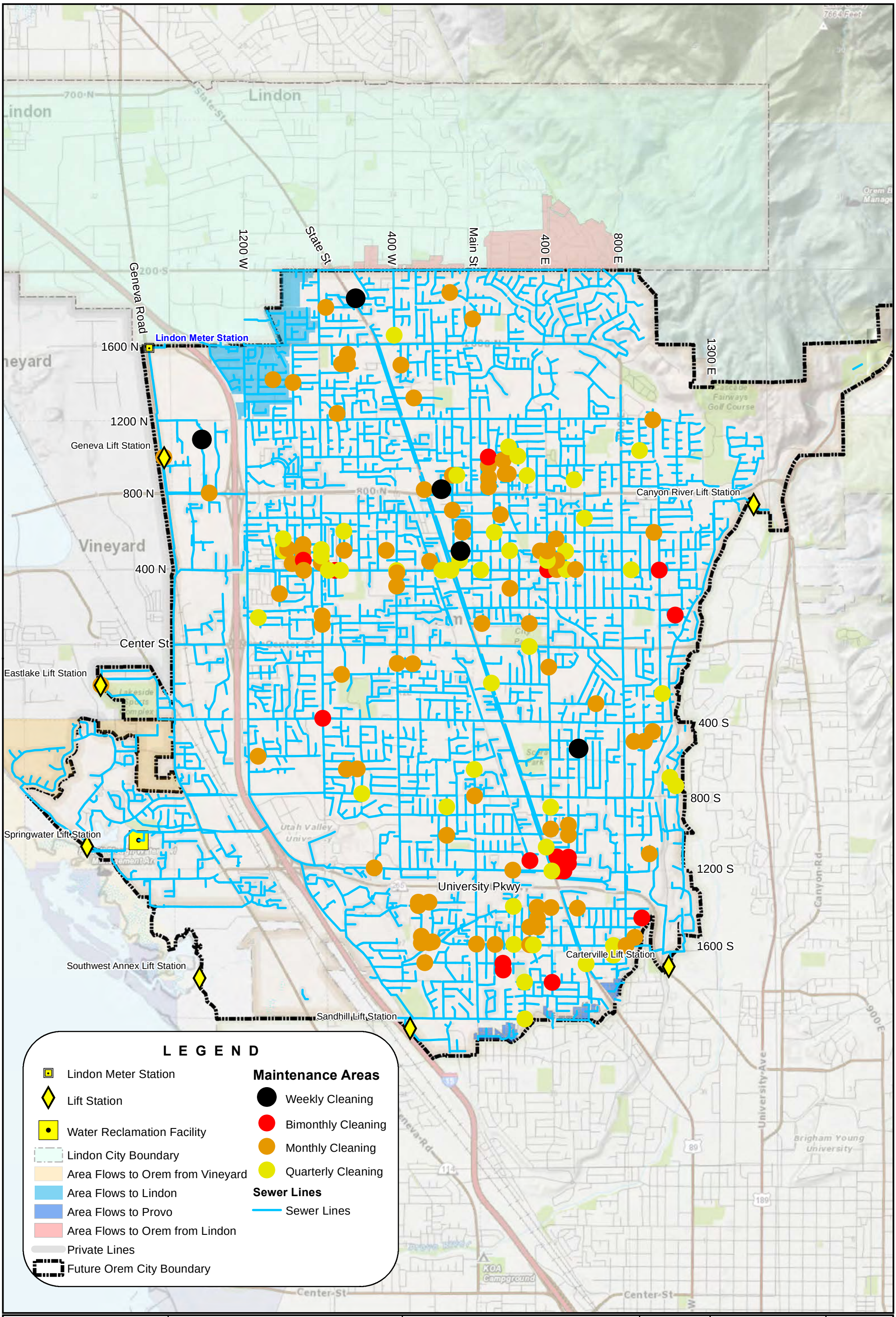
In order to assemble a 10-year capital improvement plan, it is not adequate to consider only capacity related improvements. It is also necessary to budget for the expected rehabilitation and replacement of system components. This section examines known areas of needed rehabilitation and replacement for inclusion in the capital improvement plan. This is not a comprehensive evaluation of existing maintenance procedures or system conditions, nor is it a complete asset management plan. Instead, it is a collection of general observations assembled during the master planning process relative to system rehabilitation and replacement.

Frequent Maintenance Areas

In an effort to improve the condition of the existing sewer system, Orem City has compiled a list of potential projects that could be completed to eliminate problems that require frequent maintenance by City staff (dated 2012). Areas requiring frequent maintenance are shown in Figure 7-1. A complete list of these maintenance projects can be found in Appendix C along with a breakdown of project priorities. Projects contained in the list include:

- Replacing deteriorated pipe
- Lining existing pipe (cast in place pipe)
- Pipe/manhole flushing
- Point repairs (such as at a joint)

A summary of the costs associated with these maintenance projects and the corresponding pay-back period is shown in Table 7-1 below.



Bowen Collins & Associates, Inc. CONSULTING ENGINEERS	OREM CITY SEWER MASTER PLAN	FREQUENT MAINTENANCE AREAS	NORTH:	SCALE: 0 1,500 3,000 Feet	FIGURE NO. 7-1

P:\Orem City\2013 Master Plans\4.0 GIS\4.1 Projects\SewerMap\Sewer-Figure 7-1 - Frequent Maintenance.mxd aanderson 2/17/2016

Table 7-1
Estimated Cost of Maintenance Projects & Corresponding

Return on Investment Time Frame	Estimated Cost of Maintenance Projects (2014 dollars)
Less than 10 years	$1,249,000
10 to 20 years	$1,018,000
20 to 40 years	$1,885,000
Greater than 40 years	$1,844,000
Total	**$5,996,000**

The return on investment time frame listed in Table 7-1 was developed by estimating the time and/or materials needed to perform maintenance for each facility requiring frequent maintenance. The annual cost associated with maintenance time and/or materials was then compared with the capital cost of eliminating the problem causing the need for frequent maintenance. The return on investment time frame reflects the number of years required before the capital cost of the improvement is paid back through reduced maintenance costs.

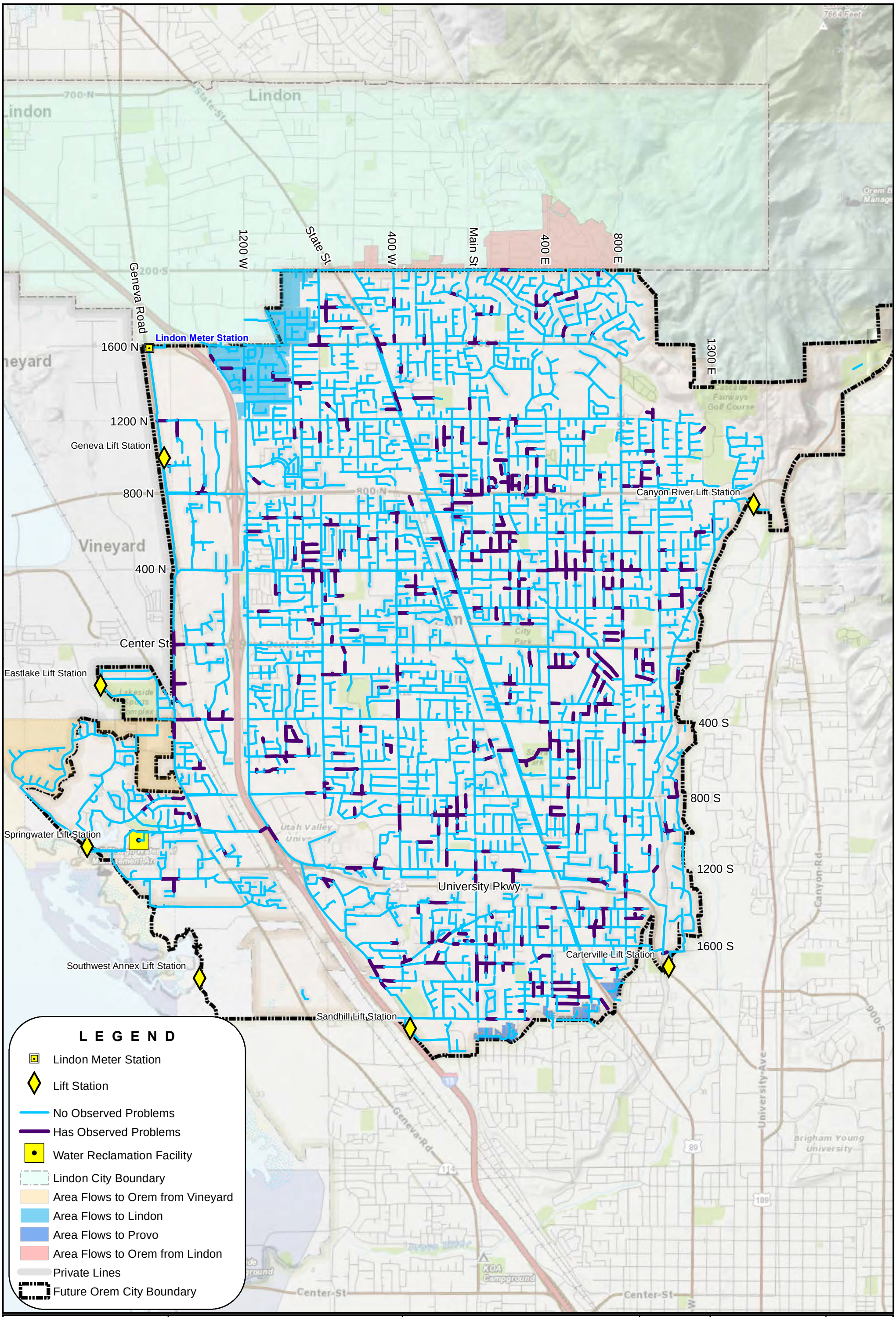
It is recommended that Orem City begin to complete the identified projects to eliminate frequent maintenance areas, starting with those that have the shortest return on investment. Even for those projects that have a longer return on investment, it is recommended that the City consider opportunities to complete some of these projects as opportunities arise. It is important to keep in mind that, as the system ages, these maintenance areas will continue to get worse and new areas will appear. Keeping up with maintenance projects and pipe replacement will help prevent the system from falling into disrepair and will reduce the amount that the City needs to spend in the long run.

Concrete Pipe Assessment and Rehabilitation

One major category of concern relative to sewer system rehabilitation and replacement is the corrosion of existing concrete pipe. Hydrogen sulfide gas in a sewer system can result in the formation of sulfuric acid (H_2SO_4) on pipe and manhole walls. Sulfuric acid can result in severe corrosion of ferrous metals and concrete. The top of a moist concrete pipe is a common area for the formation of sulfuric acid and corresponding corrosion. This is a significant concern for Orem because a large portion of the City's collection system is constructed of concrete pipe.

Orem City diligently inspects pipes on a regular basis to identify rehabilitation needs. Figure 7-2 identifies collection pipes in the City with observed deficiencies such as sulfuric acid related corrosion, breaks or cracks in the line, offset joints, bellies, roots, and infiltration. Some of these observed deficiencies can be eliminated with maintenance, but others require repair and replacement. It is recommended that the City continue to diligently perform preemptive pipe inspections to identify areas where corrosion may be occurring.

Figure 7-3 identifies some areas of the system where H_2S corrosion may be more likely. This is the result of two factors:



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OREM CITY
SEWER MASTER PLAN

SEWER PIPES WITH OBSERVED STRUCTURAL ISSUES

NORTH:

SCALE: 0 1,500 3,000 Feet

FIGURE NO. 7-2

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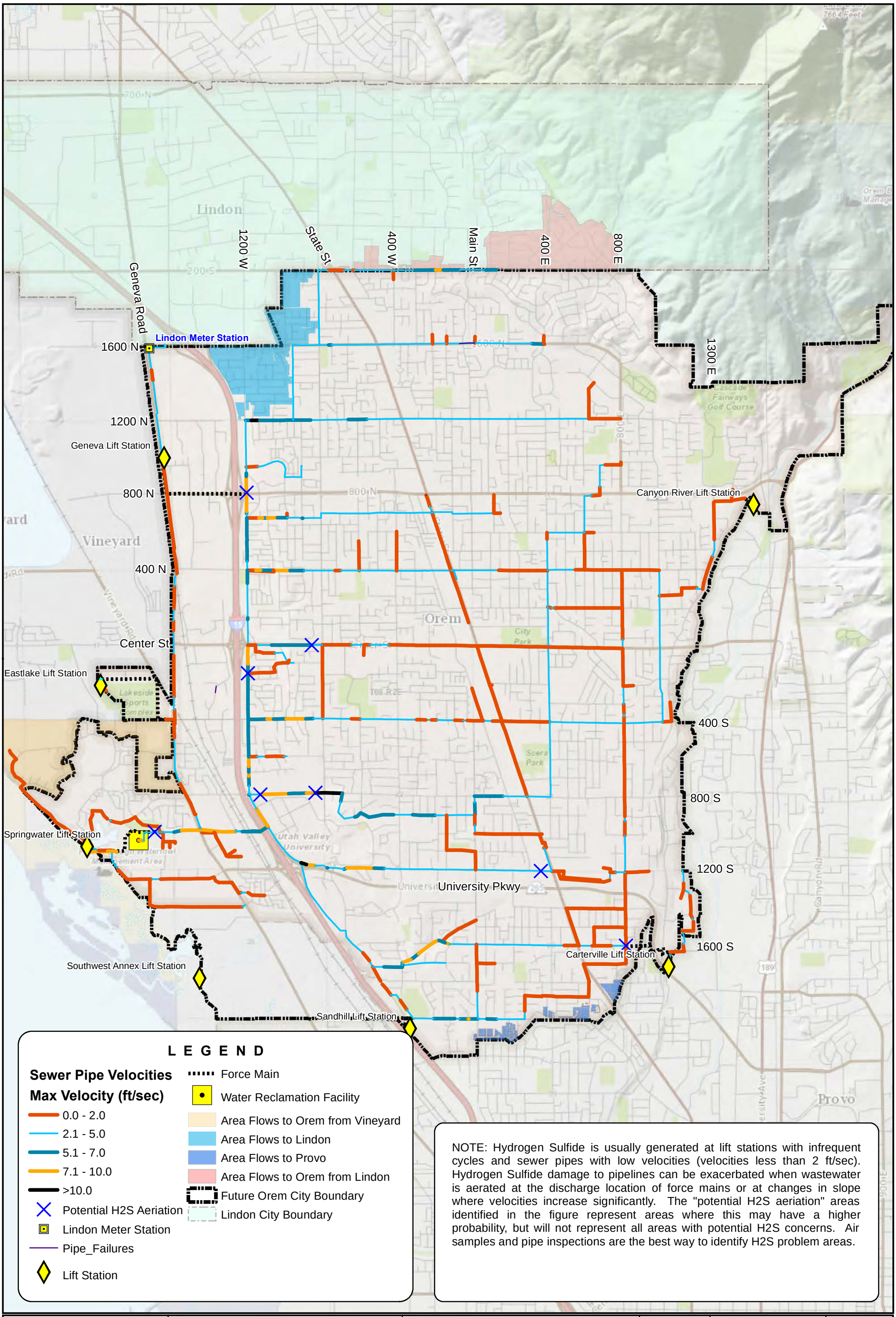

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OREM CITY
SEWER MASTER PLAN

PIPES WITH LOW VELOCITIES AND H2S AERATION CONCERN AREAS

NORTH:

SCALE: 0 1,500 3,000 Feet

FIGURE NO. 7-3

P:\Orem City\2013 Master Plans\4.0 GIS\4.1 Projects\SewerMap\Sewer-Figure 7-3 - H2S Potential Areas.mxd amckinnon 4/21/2015

- ***Hydraulic Conditions*** – H_2S formation is affected by hydraulic conditions in two ways. First, where velocities are low, there is more potential for the accumulation of a slime layer with the bacteria that create H_2S. As a general guideline, pipes with velocities less than 2 ft/sec have a higher probability of developing the anaerobic conditions that generate hydrogen sulfide. Second, where pipes have high velocities, there is a higher probability of aerating the wastewater and releasing the hydrogen sulfide gas that leads to damage of concrete pipe. Figure 7-3 indicates maximum flow velocities in sewer pipes for existing conditions. Of primary concern are those areas where long sections of low velocity flow are followed by a section with high velocity flow (the H_2S forms in the slow sections and is then released in the fast sections). Figure 7-3 identifies a few areas in the City where hydrogen sulfide could potentially be aerated because of significant changes in velocity. However, there are many other factors that can contribute to pipe deterioration including changes of use (e.g. construction of restaurants) and increases or decreases in flow from changing demographics.
- ***Force Main Discharge*** – Other areas of concern for hydrogen sulfide accumulation are at force main discharge locations. Because force mains flow full, very little corrosion will occur through the force main pipe. However, because they full, there is a larger hydrogen sulfide producing slime layer. As the pipes discharge into gravity mains and the flow is aerated, hydrogen sulfide gas can be released.

Where corrosion is observed, it is recommended that aggressive rehabilitation efforts be initiated to protect the pipeline from further damage. If the corrosion has not yet damaged the structural integrity of the pipeline, a cast-in-place pipe (CIPP) rehabilitation can often be done relatively inexpensively to protect the existing concrete and preserve the full design life of the pipe. If the corrosion has progressed to the point that the structural steel in the pipeline is compromised, a more expensive structural rehabilitation or complete replacement of the pipeline will be required.

Because hydrogen sulfide presents a major risk to the City's wastewater infrastructure, it is recommended that condition assessment of the City's existing infrastructure and prioritization of H2S related rehabilitation be an immediate priority. With the initial dollars that become available for this purpose, it is recommended that the City use its own forces and/or contract with outside inspection companies to perform a complete inspection and inventory of the City's existing pipelines. Using the information obtained through this inspection, the City can then develop an asset management plan to prioritize future rehabilitation activities.

System Rehabilitation and Replacement Priorities

Because funding is always limited, it is important to prioritize initial system rehabilitation efforts based on the potential consequence of a pipe not performing as designed. The following criteria may be helpful to Orem City personnel in identifying pipes that are most critical based on their relative importance in the collection system:

- Sewer Flow Rate – Flow rate in a sewer pipe is the single most important indicator of the importance of a pipe. Generally speaking, the higher the flow rate, the larger the area which a pipe serves. Bypass pumping costs, the risk if property damage, environmental and regulatory consequences, the cost of pipe replacement, and problems from sewage up

in the system are all more severe for larger flow rates. In a worst case scenario, if a pipe collapses or becomes blocked and surcharging in the pipeline results in flows backing up into basements and streets, there is a much greater health hazard to the public with a high flow pipe.

- Road Type – It is much more difficult and costly to perform sewer line repairs on streets with dense traffic. Therefore, pipelines located in high traffic areas should be considered more critical than lower traffic areas. For example, the cost of pipe failure along 800 North or State Street would be much greater than an equivalent sized pipe located on a residential street.

- Pipe Depth – The depth of the pipe can have a significant impact on the cost of repairs and rehabilitation of sewer pipe. Extensions on backhoes, very wide trenches, dewatering, etc. make repairs and maintenance much more expensive and time consuming on deeper pipes. Repairing such pipes under an emergency situation would only be that more difficult. For this reason, deep pipelines should be prioritized over shallow pipelines when planning a repair or maintenance schedule.

CAPITAL IMPROVEMENTS BUDGET

Before establishing a 10-year capital improvement plan, it is necessary to determine how much funding will be set aside each year for capital improvements. One of the best ways to identify a recommended level of funding is to consider system service life. As with all utilities, each component of a sewer system has a finite service life. Therefore, it is necessary to continually spend money towards the rehabilitation or replacement of these components. If adequate funds are not set aside for regular system renewal, the collection system will fall into a state of disrepair and be incapable of providing the level of service that Orem City customers expect.

Orem City's sewer collection system is composed of about 1.5 million feet of pipe and over 6,400 manholes. The total cost to replace all of the pipes and lift stations in the Orem collection system would be approximately $380 million based on 2015 construction costs. In reality, it will not be necessary to completely replace the entire system as it ages because of rehabilitation technologies (e.g. slip lining, cast-in-place pipe, etc.). Rehabilitation costs are much lower than replacement costs (20% to 60% depending on pipe diameter). If Orem were able to rehabilitate the entire system rather than replace components, it would drastically reduce the "replacement value" to $90 million. Unfortunately, it is generally not possible to rehabilitate all system components due to either condition or capacity issues. Some pipes are beyond saving with rehabilitation, while others may require upsizing or correction of grade issues; all of these scenarios would require a replacement.

To account for the limitations on rehabilitation, BC&A recommends a renewal budget derived from a combination of rehabilitation and replacement using an approximate design life of 70 years. Table 7-2 shows a comparison of the required annual budget based on replacement, rehabilitation, and the recommended combination of both values.

Table 7-2
Recommended Sewer Collection System Renewal Budget

System Renewal	Annual Budget (2014 Dollars)*
Replacement of all system components	$5,700,000
Rehabilitation of all system components	$1,350,000
50% replacement 50% rehabilitation	**$3,525,000**

*1.5% of complete system "replacement" (ENR=9870) which assumes an average 70 year life cycle for all system components (pipes, pump stations, etc.)

In addition to the collection system, a yearly budget should also be designated for the renewal of the Water Reclamation Facility. The total cost to replace the WRF would be approximately $80 million. Since the WRF incorporates several mechanical and electrical components, a shorter design life (50 years) was assumed. Table 7-3 shows the total recommended capital improvement budget for the sewer collection and treatment system.

Table 7-3
Recommended Total Sewer System Annual Capital Improvement Budget

Component	Value
Collection System	$3,525,000
Water Reclamation Facility	$1,600,000
Total	**$5,125,000**

In addition to system renewal requirements required for maintenance programs, there are also work force needs to operate and maintain facilities. Work force needs are discussed further in a technical memorandum in Appendix D.

10-YEAR CAPITAL IMPROVEMENT PLANS

Based on the City's identified project needs and recommended level of capital investment, BC&A has developed four potential capital improvement scenarios covering the next 10 years. These scenarios are shown in Figures 7-4 through 7-7 and detailed in Table 7-4 through 7-7. The process of developing the several scenarios was as follows

- **Identify the Revenue Available for CIP Based on Current Rates –** Each of the figures show the revenue that is projected to be available for capital improvement projects based on current rates. This represents the revenue the City would have available for capital improvements over the next 10 years if it does not make any changes to its existing rates. It will be noted that this revenue increases gradually over time as additional users join the system.

- **Identify the Recommended CIP Funding Level Based on System Value –** Each of the figures also show the recommended capital improvement project funding level for the wastewater system. This is the level of funding sufficient to perform maintenance related projects and system renewal as discussed previously. This level of funding increases over time to keep up with both system growth and inflation.
- **Develop a Transition Plan between the Current and Recommended Levels of Funding –** From the several figures, it is apparent that the projected revenue associated with existing rates will be woefully inadequate to implement the capital improvement projects needed in the City's wastewater system. At current rates, the City would not be able to keep up with system renewal projects and the level of service in the City's sewer collection and treatment system would begin to decline. Because of the dramatic difference between existing revenue and recommended CIP funding, a budget plan is needed to gradually transition between the two. The several scenarios look at different ways to reach the recommended level of funding:

    - **Scenario 1, 5-year Phase In (Figure 7-4, Table 7-4):** As a starting point, BC&A looked at the immediate needs of the City and identified a transition plan that would address all the most pressing needs while limiting annual rate increases. This resulted in the development of Scenario 1. This scenario includes transitioning to the recommended long-term level of funding over a period of 5 years. This scenario would allow the City to construct all of the recommended projects identified in the planning window and begin to implement additional maintenance and renewal projects.
    - **Scenario 2, 7-year Phase In (Figure 7-5, Table 7-5):** To minimize the required annual increases to the rates, BC&A also looked at slower implementation options. Scenario 2 includes a transition from current to recommended levels of funding over a period of 7 years. While this would reduce rate increases and would allow the City to complete all of its highest priority projects, it would require the City to postpone recommended maintenance and renewal projects. Over time, neglect to these areas will result in a reduced level of service and lead to more frequent and costly emergency repairs. Selection of Scenario 2 over Scenario 1 would result in the delay of $2.5 million in system maintenance improvements.
    - **Scenario 3, 10-year Phase In (Figure 7-6, Table 7-6):** This scenario is similar to Scenario 2, but would transition from current to recommended levels of funding over a period of 10 years. Selection of Scenario 3 over Scenario 1 would result in the delay of $5.9 million in system maintenance improvements.
    - **Scenario 4, Bonding (Figure 7-7, Table 7-7):** The previous three scenarios have looked at funding capital improvements on a pay as you go basis. As an alternative, the City could consider using bond funding as a way to accomplish more of the recommended projects without increasing rates as dramatically up front. Bond funding would also allow some of the costs incurred today to be paid for by future users that will benefit from the improvements. Scenario 4 includes funding all of the same projects as identified in Scenario 1, but uses bond funding to limit rate increases to levels slightly below those identified in Scenario 3. To accomplish this plan, the City would need to take out bonds of $4.5 million and

$7.5 million in 2018 and 2021 respectively. These would be used primarily to pay for collection system projects (e.g. Carterville Force Main Relocation, Springwater Lift Station, etc.) and treatment plant projects (Struvite Elimination, Headworks Replacement, etc.). Normal rate revenue could then be used for system maintenance and renewal.

Tables 7-4 through 7-7 list the improvement projects that could be completed within the next 10-years for Scenarios 1 through 4, respectively. Figures 7-4 through 7-7 show this same information graphically. For comparison purposes, Figure 7-4 includes the total level of funding for all four of the scenarios. System improvement projects have been grouped into the following major budget categories:

- **Collection System Capacity Improvements –** Collection system capacity improvements include projects needed to remedy existing deficiencies in the collection system or to increase capacity to accommodate future growth. Projects included within the next 10-years are those projects with existing deficiencies or deficiencies projected to occur within the next 10-years without improvements. Because these improvements are driven by projected growth, there is little flexibility in when they can be completed.
- **Water Reclamation Facility –** The overall capacity at the City's water reclamation facility (WRF) will be adequate for many years. However, there are a number of components at the WRF that will need to be upgraded or replaced within the next 10-years to continue to provide adequate service for the City. Projects to be included within the next 10-years were identified by City personnel. While there is some flexibility in the timing of these projects, unduly postponing their completion will lead to difficulty meeting treatment standards at the WRF.
- **Maintenance/H2S Related Projects –** Maintenance and H2S related projects include those projects identified above that are associated with frequent maintenance, observed condition issues, or H2S corrosion. There is significant flexibility in when these projects are completed. In the case of the frequent maintenance issues, the City could postpone all these projects indefinitely and just keep performing the maintenance. However, the sooner the projects are completed, the sooner the City will start realizing the savings associated with reduced maintenance costs. In the case of observed condition issues, the City might also postpone the improvements, but this will result in significant future expenditures. As discussed previously, maintenance issues will continue to surface as the system infrastructure ages, and the City will benefit by staying up to date on maintenance.
- **Vehicle (Fleet) Replacement –** City personnel have developed a schedule for vehicle replacement based on approximate use, depreciation, and reliability for maintenance vehicles in the City. Because the City has been behind on its replacement schedule over the last several years, the first two years of the recommended sewer budget include a larger proportion of total capital costs for vehicle replacement as the City replaces some of its vehicles that are already beyond their useful service life. However, these costs should decrease and then remain relatively constant as the City replaces vehicles at more regular intervals in the future.
- **Unplanned System Repairs –** Because the City cannot predict precisely when and where pipe failure may occur in the system, a budget item needs to be included in the

recommended capital fund plan that is dedicated to unplanned repairs. This money will then be available to address repairs to be performed when a deficiency is observed in the system. These likely would include point repairs that appear to be of an urgent nature in the system.

- **System Replacement/Renewal –** After accomplishing all of the specific improvements identified above, any remaining capital improvement budget would be dedicated to system replacement. System replacement costs will include identifying those areas of the City's collection system that appear to be aging and in need of repair or replacement. This budget item will include pipes identified via the City's inspection program that need lining or replacement.
- **SW Annex Improvements –** It will be noted that no costs have been shown in the plan for improvements associated with the Southwest Annex. These projects have been left out of the City's 10-year capital improvement budget because they will be funded and constructed by the annex developers.

Ultimately, selection of an implementation scenario has been left to the City's discretion. All of the scenarios will accomplish the City's most pressing capital improvement projects and will fund the system at the long-term recommended level of funding by the end of the 10-year planning window. Selection of a more or less aggressive implementation plan will ultimately depend on the City's desire to proactively invest in its system versus its tolerance for rate increases. In general, it is recommended that the City implement the transition as quickly as possible since system investment to protect existing assets has been consistently shown to reduce total long-term costs.

Table 7-4
10-Year Capital Improvement Plan – Scenario 1, 5-Year Phase In Plan

Project Identifier	Project Description	Estimated Total Cost (2106 Dollars)	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026
SS 1	Relocate Carterville Force Main to 1200 South	$667,000		$707,620								
SS 2	Replace Springwater Lift Station	$907,000	$934,210									
SS 3	Replace 6,850 feet of existing 10-inch line with 18-inch line in 1400 South (Chambery to Springwater)	$1,575,000					$1,825,857					
SS 4	Install 2,700 feet 6-inch force main parallel to existing 10-inch force main from Springwater Lift Station	$357,000						$426,277				
SS 5	Replace 1,260 feet of existing 27-inch/30-inch line with 36 inch line along College Drive at 800 South	$813,000							$999,887			
SS 6	Replace 820 feet of existing 12-inch pipe with 15-inch pipe along College Drive at 1200 South	$249,000									$324,889	
WRF 1	Replace screen washer	$100,000		$106,090								
WRF 2	Expand aeration basin in headworks	$400,000					$463,710					
WRF 3	Replace grit washer	$200,000			$218,545							
WRF 4	Third press in solids handling	$500,000				$562,754						
WRF 5	Struvite elimination	$1,600,000			$1,748,363							
WRF 6	Concrete/membrane existing lagoons	$500,000						$597,026				
WRF 7	Replace back-up generator	$500,000						$597,026				
M 1	Frequent maintenance related projects	$5,996,000		$1,272,231	$655,199	$674,855	$695,101	$715,954	$737,432	$759,555	$782,342	$805,812
M 2	675 N. 1060 W. to 1200 W. - H2S Concern	$55,000			$60,100							
M 3	1720 S. 400 W. to Sand Hill Road - H2S Concern	$60,000			$65,564							
M 4	Eastwood Street - Replacement Project	$200,000									$260,955	
M 5	Westwood Street - Replacement Project	$250,000									$326,193	
M 6	H2S Rehabilitation Program	$14,665,000	$500,000	$500,000	$500,000	$1,518,214	$1,500,000	$2,000,000	$2,500,000	$3,000,000	$3,000,000	$3,000,000
System Replacement	Replace system as needed	$14,786,000	$81,378	$638,416	$953,741	$2,323,666	$1,503,671	$1,898,541	$2,213,316	$2,918,362	$2,226,020	$3,321,636
Repairs	Unplanned repair fund	$750,000	$77,250	$79,568	$81,955	$84,413	$86,946	$89,554	$92,241	$95,008	$97,858	$100,794
Fleet Replacement	Fleet maintenance and replacement	$3,666,000	$746,980	$504,780	$464,748	$410,469	$360,272	$332,064	$342,026	$348,271	$347,335	$358,318
	TOTAL	**$48,796,000**	**$2,339,818**	**$3,808,706**	**$4,748,215**	**$5,574,372**	**$6,435,555**	**$6,656,442**	**$6,884,902**	**$7,121,196**	**$7,365,592**	**$7,586,560**

Table 7-5
10-Year Capital Improvement Plan – Scenario 2, 7-Year Phase In Plan

Project Identifier	Project Description	Estimated Total Cost (2106 Dollars)	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026
SS 1	Relocate Carterville Force Main to 1200 South	$667,000		$707,620								
SS 2	Replace Springwater Lift Station	$907,000	$934,210									
SS 3	Replace 6,850 feet of existing 10-inch line with 18-inch line in 1400 South (Chambery to Springwater)	$1,575,000					$1,825,857					
SS 4	Install 2,700 feet 6-inch force main parallel to existing 10-inch force main from Springwater Lift Station	$357,000						$426,277				
SS 5	Replace 1,260 feet of existing 27-inch/30-inch line with 36 inch line along College Drive at 800 South	$813,000							$999,887			
SS 6	Replace 820 feet of existing 12-inch pipe with 15-inch pipe along College Drive at 1200 South	$249,000									$324,889	
WRF 1	Replace screen washer	$100,000		$106,090								
WRF 2	Expand aeration basin in headworks	$400,000					$463,710					
WRF 3	Replace grit washer	$200,000			$218,545							
WRF 4	Third press in solids handling	$500,000				$562,754						
WRF 5	Struvite elimination	$1,600,000			$1,748,363							
WRF 6	Concrete/membrane existing lagoons	$500,000						$597,026				
WRF 7	Replace back-up generator	$500,000						$597,026				
M 1	Frequent maintenance related projects	$5,996,000		$1,272,231	$655,199	$674,855	$695,101	$715,954	$737,432	$759,555	$782,342	$805,812
M 2	675 N. 1060 W. to 1200 W. - H2S Concern	$55,000			$60,100							
M 3	1720 S. 400 W. to Sand Hill Road - H2S Concern	$60,000			$65,564							
M 4	Eastwood Street - Replacement Project	$200,000									$260,955	
M 5	Westwood Street - Replacement Project	$250,000									$326,193	
M 6	H2S Rehabilitation Program	$14,665,000	$500,000	$500,000	$500,000	$1,518,214	$1,500,000	$2,000,000	$2,500,000	$3,000,000	$3,000,000	$3,000,000
System Replacement	Replace system as needed	$12,528,000	$81,378	$112,604	$375,818	$1,802,622	$900,000	$1,600,000	$2,213,316	$2,918,362	$2,226,020	$3,321,636
Repairs	Unplanned repair fund	$750,000	$77,250	$79,568	$81,955	$84,413	$86,946	$89,554	$92,241	$95,008	$97,858	$100,794
Fleet Replacement	Fleet maintenance and replacement	$3,666,000	$746,980	$504,780	$464,748	$410,469	$360,272	$332,064	$342,026	$348,271	$347,335	$358,318
	TOTAL	**$46,538,000**	**$2,339,818**	**$3,282,893**	**$4,170,292**	**$5,053,328**	**$5,831,885**	**$6,357,901**	**$6,884,902**	**$7,121,196**	**$7,365,592**	**$7,586,560**

Table 7-6
10-Year Capital Improvement Plan – Scenario 3, 10-Year Phase In Plan

Project Identifier	Project Description	Estimated Total Cost (2106 Dollars)	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026
SS 1	Relocate Carterville Force Main to 1200 South	$667,000		$707,620								
SS 2	Replace Springwater Lift Station	$907,000	$934,210									
SS 3	Replace 6,850 feet of existing 10-inch line with 18-inch line in 1400 South (Chambery to Springwater)	$1,575,000					$1,825,857					
SS 4	Install 2,700 feet 6-inch force main parallel to existing 10-inch force main from Springwater Lift Station	$357,000						$426,277				
SS 5	Replace 1,260 feet of existing 27-inch/30-inch line with 36 inch line along College Drive at 800 South	$813,000							$999,887			
SS 6	Replace 820 feet of existing 12-inch pipe with 15-inch pipe along College Drive at 1200 South	$249,000									$324,889	
WRF 1	Replace screen washer	$100,000		$106,090								
WRF 2	Expand aeration basin in headworks	$400,000					$463,710					
WRF 3	Replace grit washer	$200,000			$218,545							
WRF 4	Third press in solids handling	$500,000				$562,754						
WRF 5	Struvite elimination	$1,600,000			$1,748,363							
WRF 6	Concrete/membrane existing lagoons	$500,000						$597,026				
WRF 7	Replace back-up generator	$500,000						$597,026				
M 1	Frequent maintenance related projects	$5,996,000		$1,272,231	$655,199	$674,855	$695,101	$715,954	$737,432	$759,555	$782,342	$805,812
M 2	675 N. 1060 W. to 1200 W. - H2S Concern	$55,000			$60,100							
M 3	1720 S. 400 W. to Sand Hill Road - H2S Concern	$60,000			$65,564							
M 4	Eastwood Street - Replacement Project	$200,000									$260,955	
M 5	Westwood Street - Replacement Project	$250,000									$326,193	
M 6	H2S Rehabilitation Program	$14,665,000	$500,000	$412,604	$500,000	$1,611,624	$1,500,000	$2,000,000	$2,500,000	$3,000,000	$3,000,000	$3,000,000
System Replacement	Replace system as needed	$9,770,000	$81,378	$0	$294,364	$1,177,520	$300,000	$1,000,000	$1,600,000	$2,500,000	$2,000,000	$3,321,636
Repairs	Unplanned repair fund	$750,000	$77,250	$79,568	$81,955	$84,413	$86,946	$89,554	$92,241	$95,008	$97,858	$100,794
Fleet Replacement	Fleet maintenance and replacement	$3,666,000	$746,980	$504,780	$464,748	$410,469	$360,272	$332,064	$342,026	$348,271	$347,335	$358,318
	TOTAL	**$43,780,000**	**$2,339,818**	**$3,082,893**	**$3,870,292**	**$4,746,738**	**$5,231,885**	**$5,757,901**	**$6,271,586**	**$6,702,834**	**$7,139,571**	**$7,586,560**

Table 7-7
10-Year Capital Improvement Plan – Scenario 4, With Bonding

Project Identifier	Project Description	Estimated Total Cost (2106 Dollars)	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026
SS 1	Relocate Carterville Force Main to 1200 South	$667,000		$707,620								
SS 2	Replace Springwater Lift Station	$907,000		$962,236								
SS 3	Replace 6,850 feet of existing 10-inch line with 18-inch line in 1400 South (Chambery to Springwater)	$1,575,000					$1,825,857					
SS 4	Install 2,700 feet 6-inch force main parallel to existing 10-inch force main from Springwater Lift Station	$357,000					$413,861					
SS 5	Replace 1,260 feet of existing 27-inch/30-inch line with 36 inch line along College Drive at 800 South	$813,000					$942,490					
SS 6	Replace 820 feet of existing 12-inch pipe with 15-inch pipe along College Drive at 1200 South	$249,000									$324,889	
WRF 1	Replace screen washer	$100,000		$106,090								
WRF 2	Expand aeration basin in headworks	$400,000					$463,710					
WRF 3	Replace grit washer	$200,000		$212,180								
WRF 4	Third press in solids handling	$500,000					$579,637					
WRF 5	Struvite elimination	$1,600,000		$1,697,440								
WRF 6	Concrete/membrane existing lagoons	$500,000					$579,637					
WRF 7	Replace back-up generator	$500,000					$579,637					
M 1	Frequent maintenance related projects	$5,996,000	$617,588	$1,908,347			$2,085,302			$759,555	$782,342	$805,812
M 2	675 N. 1060 W. to 1200 W. - H2S Concern	$55,000		$58,350								
M 3	1720 S. 400 W. to Sand Hill Road - H2S Concern	$60,000		$63,654								
M 4	Eastwood Street - Replacement Project	$200,000						$238,810				
M 5	Westwood Street - Replacement Project	$250,000							$307,468			
M 6	H2S Rehabilitation Program	$14,665,000	$500,000	$518,448	$2,000,000	$2,000,000	$2,987,871	$1,900,000	$1,900,000	$1,900,000	$1,900,000	$1,900,000
System Replacement	Replace system as needed	$14,786,000	$398,000	$424,785	$956,959	$1,755,980	$850,825	$2,213,805	$2,662,862	$2,654,064	$2,760,746	$3,516,580
Repairs	Unplanned repair fund	$750,000	$77,250	$79,568	$81,955	$84,413	$86,946	$89,554	$92,241	$95,008	$97,858	$100,794
Fleet Replacement	Fleet maintenance and replacement	$3,666,000	$746,980	$504,780	$464,748	$410,469	$360,272	$332,064	$342,026	$348,271	$347,335	$358,318
	TOTAL	**$48,796,000**	**$2,339,818**	**$7,243,497**	**$3,503,661**	**$4,250,862**	**$11,756,043**	**$4,774,233**	**$5,304,597**	**$5,756,898**	**$6,213,169**	**$6,681,504**

Figure 7-4
Recommended Sewer Fund Expenditures, Scenario 1 - 5-year Phase In Plan

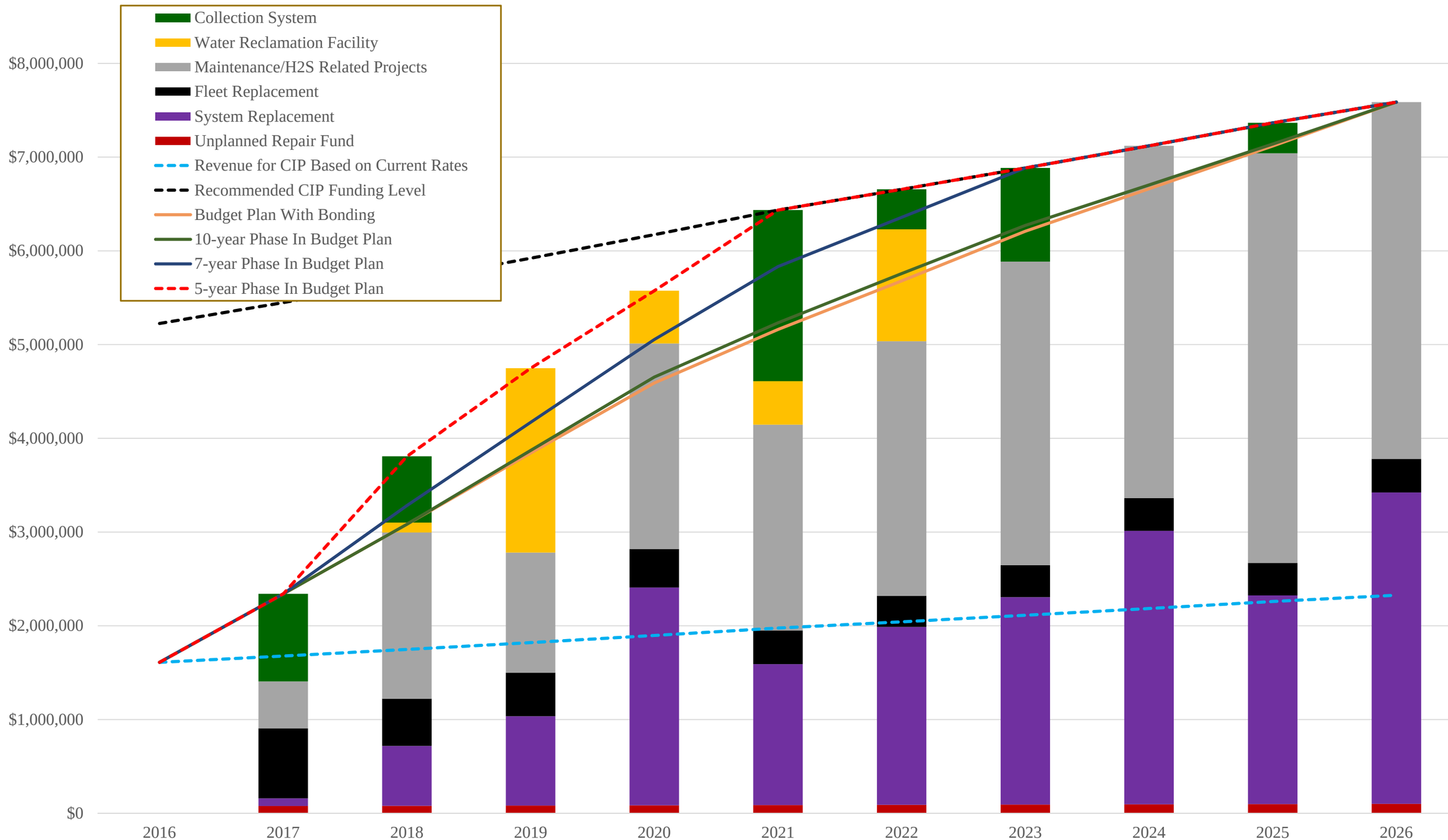


Figure 7-5
Recommended Sewer Fund Expenditures, Scenario 2 - 7-year Phase In Plan

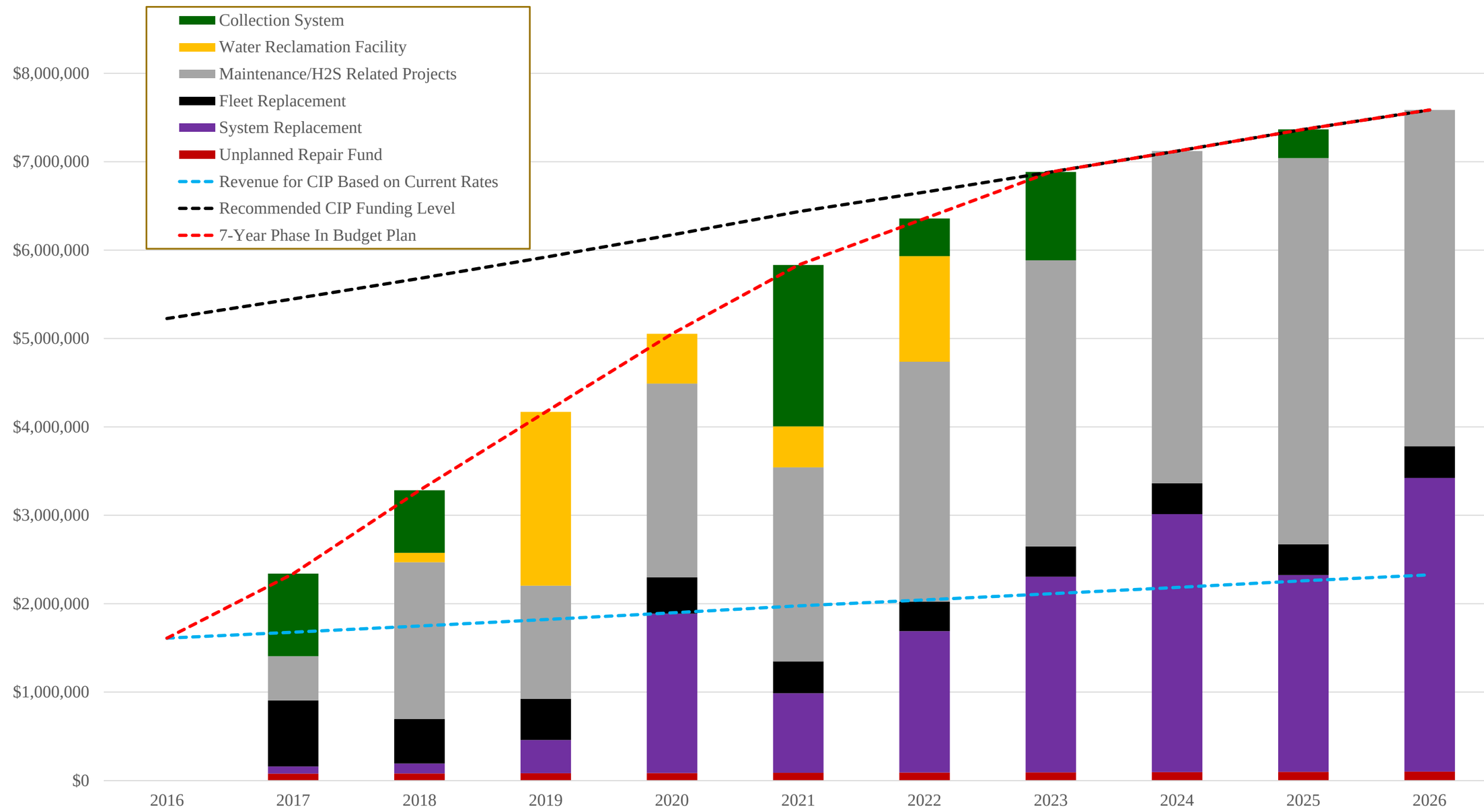


Figure 7-6
Recommended Sewer Fund Expenditures, Scenario 3 - 10-year Phase In Plan

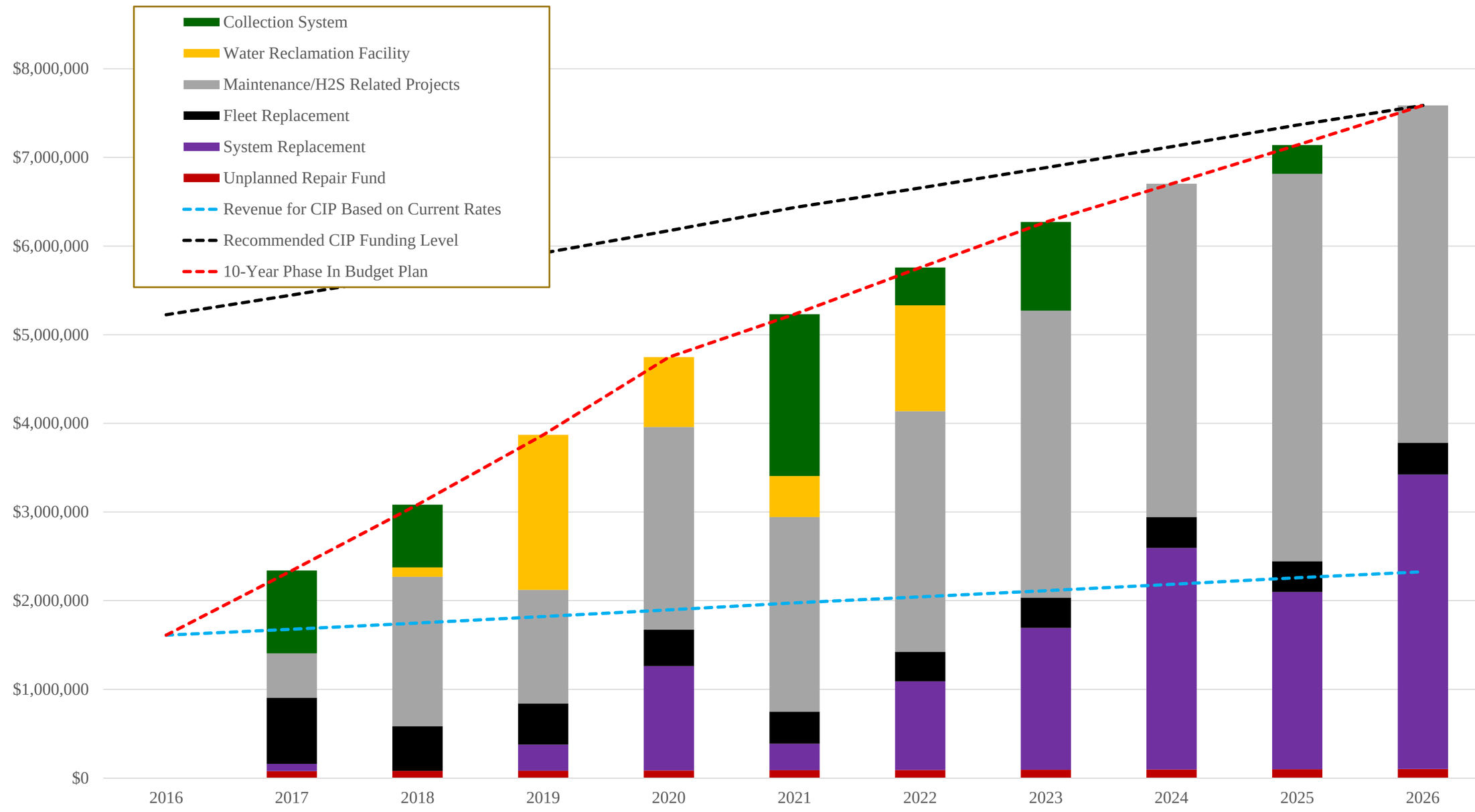
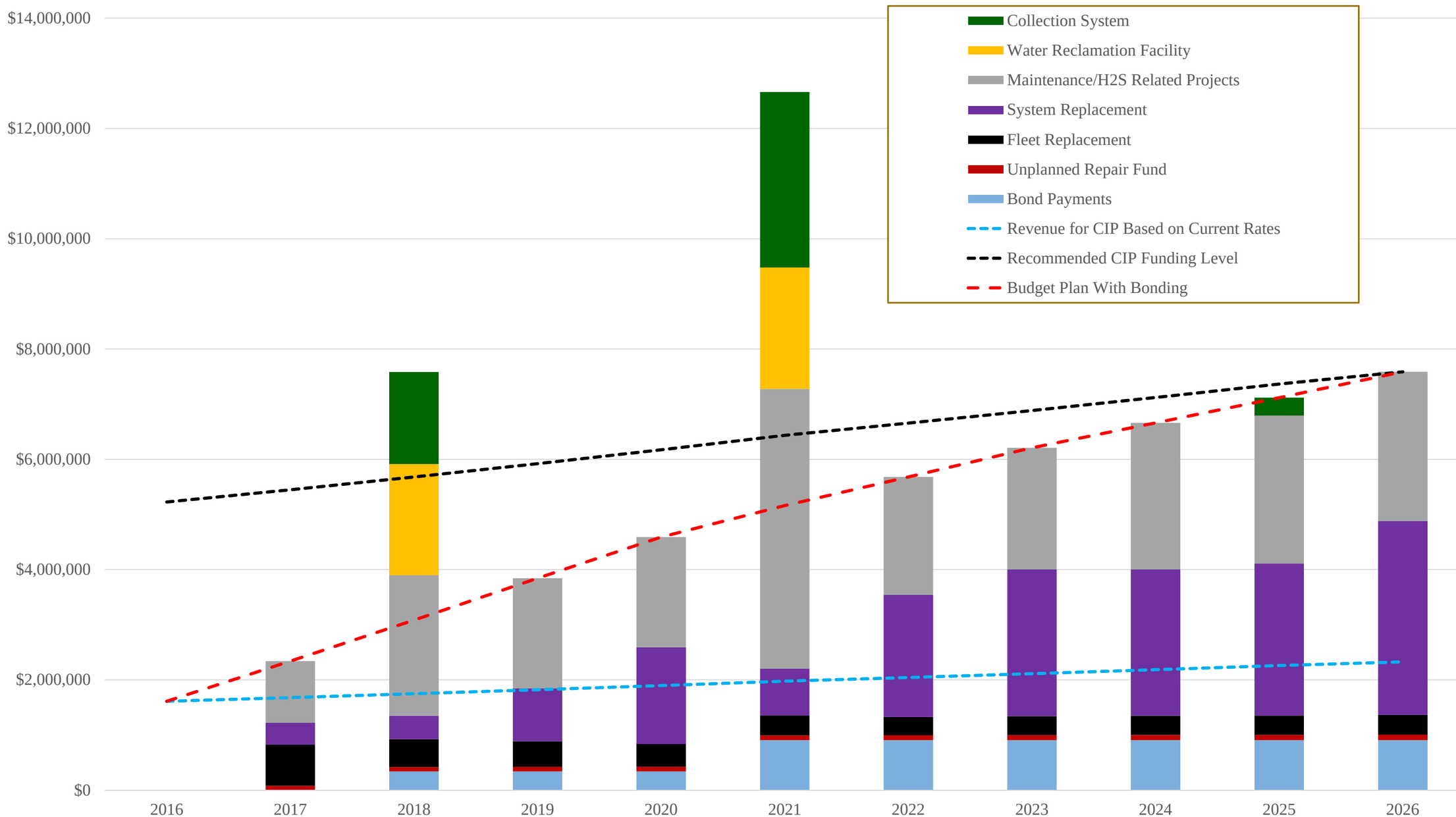


Figure 7-7
Recommended Sewer Fund Expenditures, Scenario 4 - With Bonding



APPENDIX A
LIFT STATION PUMP DATA

4" 5433
MT, W,
WD, CWD
SUBMERSIBLE

1770 RPM

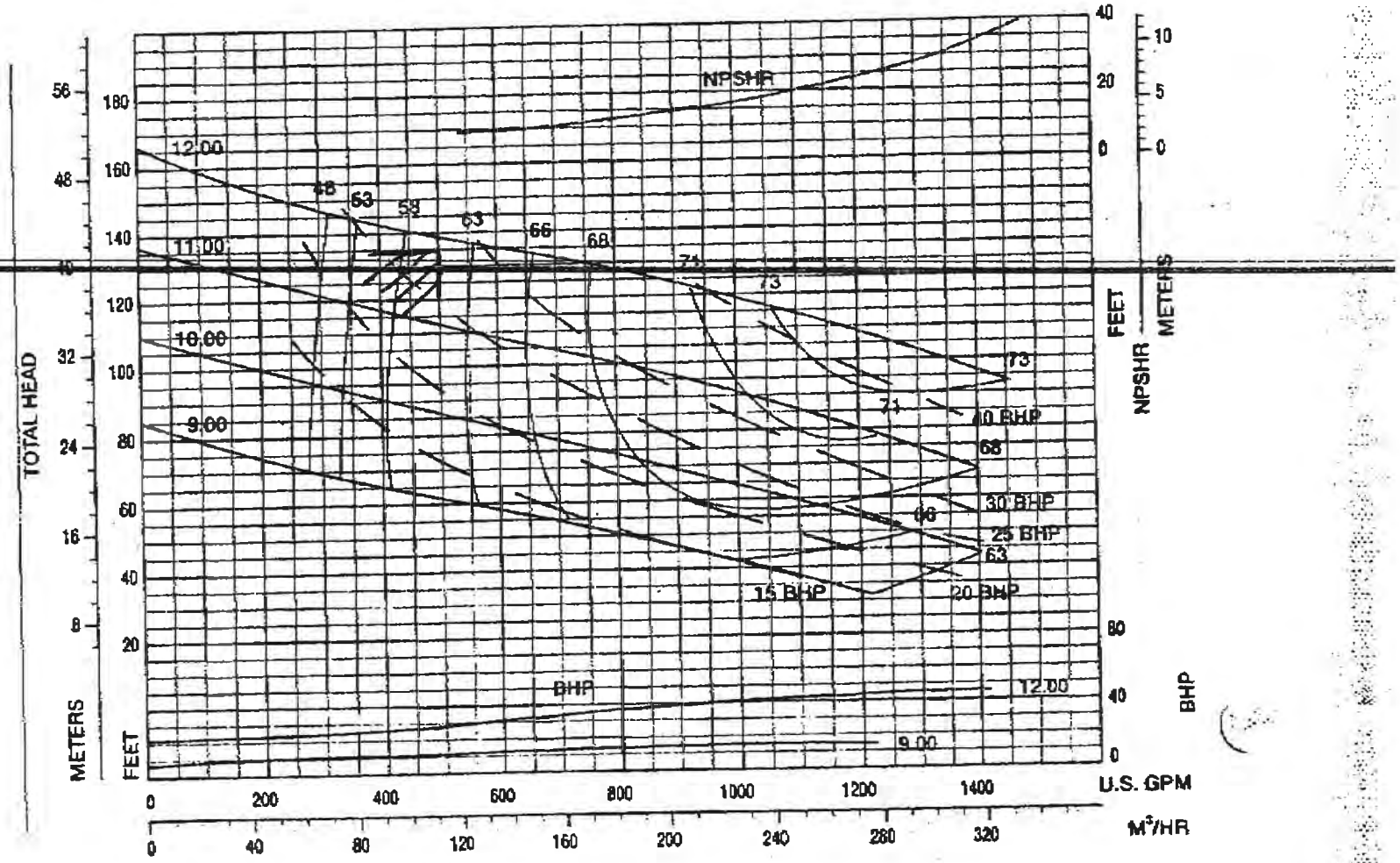
NO. OF VANES
2

SUCTION SIZE
4"
(WD: 4" OR 6")

IMPELLER
T4C1A

INLET AREA
37.50 SQ.IN.

MAX. SPHERE
3"



Fairbanks Morse Pump

8/1/97

500 gpm @ 135' TDH

40 hp Required if TDH could be less than 135'.

Carterville Lift Station

Geneva Lift Station

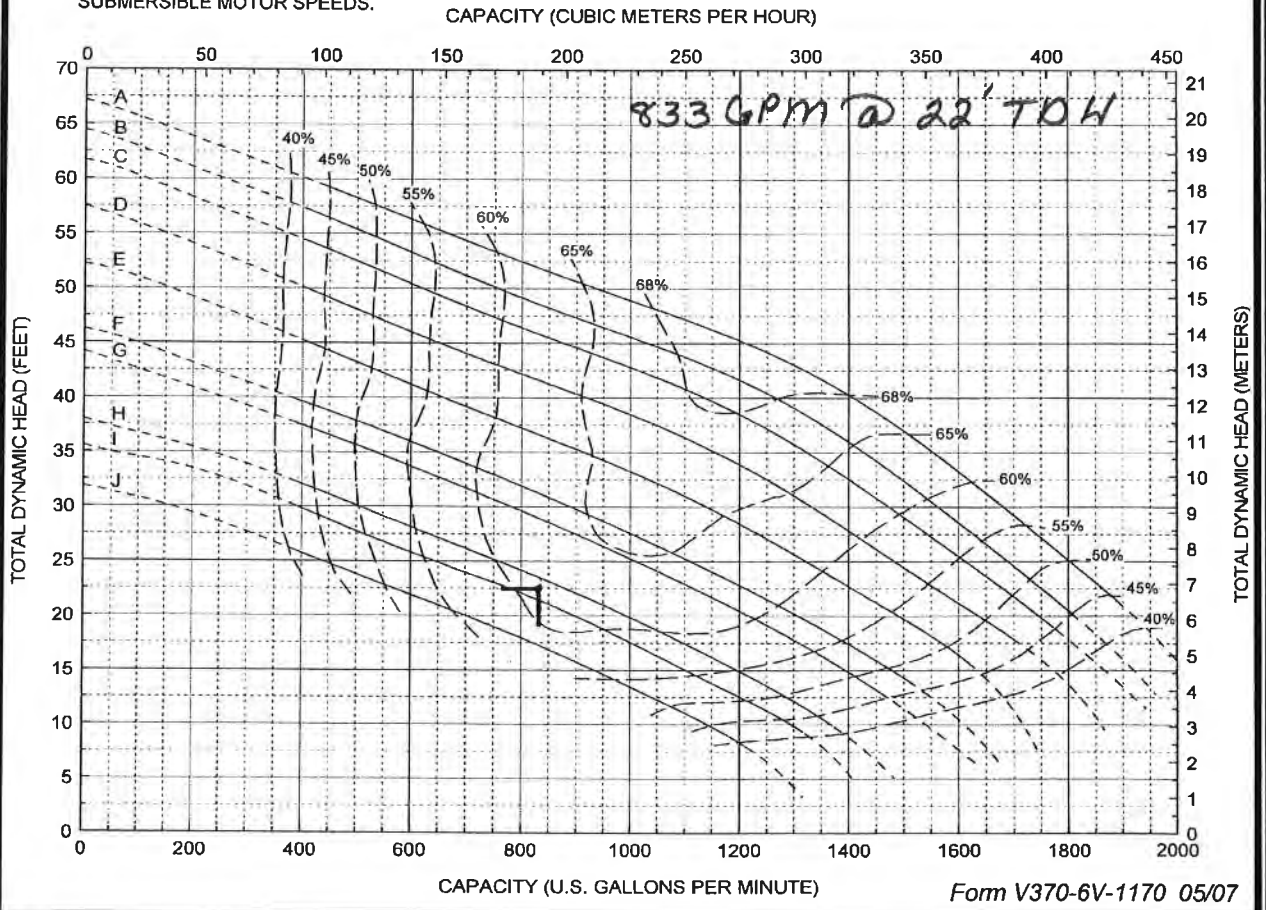
Vaughan E Series Chopper Pump PERFORMANCE CURVE

Models:
HE6U8
PE6U8
SE6U

Back-Pull-Out Casing
4-Blade Impeller
6" Discharge
8" Suction

CURVE	POWER (HP)	SPEED (RPM)	IMPELLER DIAMETER
A	25	1155	11.80" (300 mm)
B	25	1155	11.50" (292 mm)
C	20	1160	11.20" (284 mm)
D	20	1160	10.90" (277 mm)
E	15	1160	10.50" (267 mm)
F	15	1160	10.00" (254 mm)
G	15	1160	9.80" (249 mm)
H	10	1140	9.40" (239 mm)
I	10	1140	9.20" (234 mm)
J	7.5	1150	8.80" (224 mm)

DO NOT OPERATE PUMP IN DOTTED PORTION OF CURVES. CURVES SUBJECT TO CHANGE WITHOUT NOTICE. EFFICIENCIES SHOWN ARE NOMINAL BOWL. GUARANTIED MINIMUM EFFICIENCIES PER H.I. LEVEL B. CURVES ARE BASED ON SUBMERSIBLE MOTOR SPEEDS.



Form V370-6V-1170 05/07

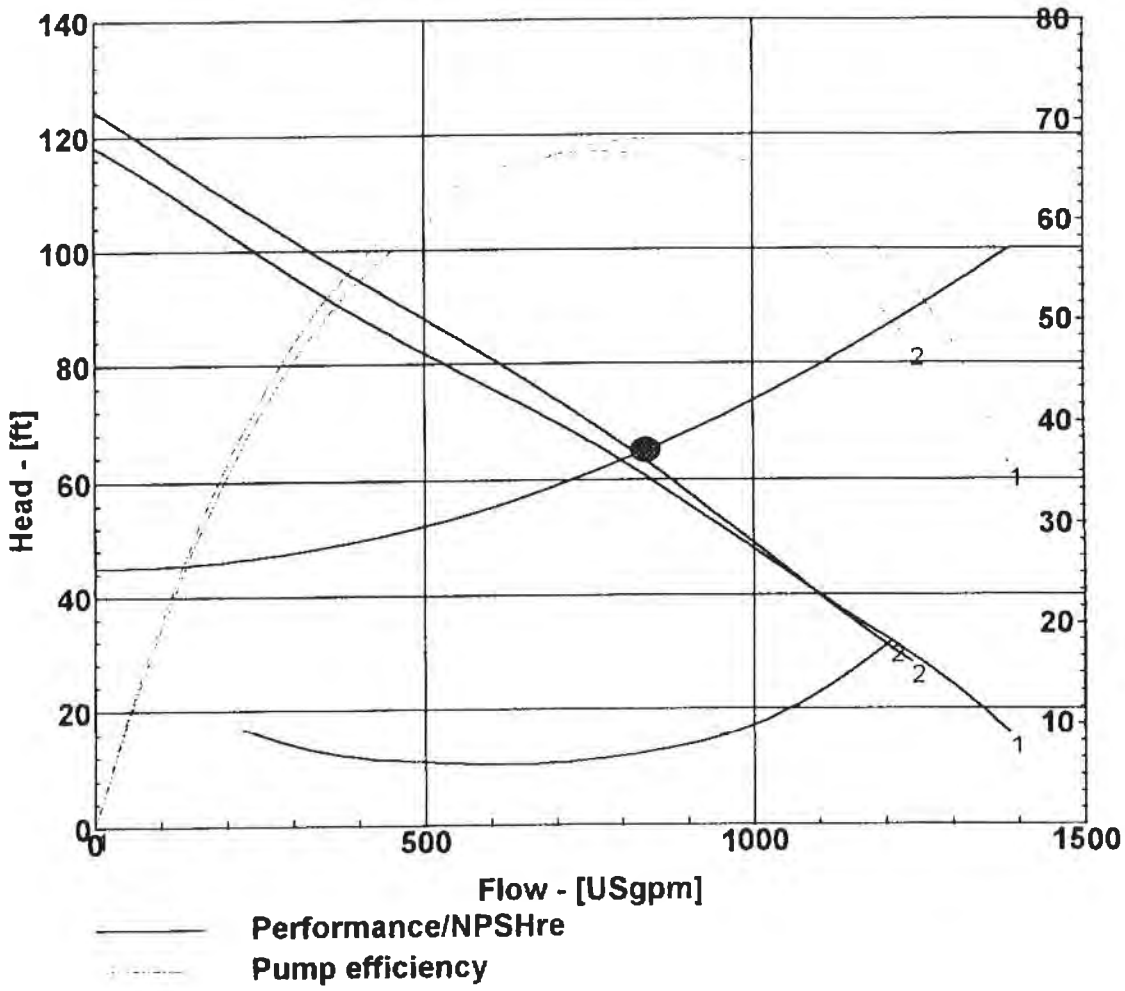
Springwater Lift Station

FLYGT

Duty Analysis - Performance curves

Project: Pump Station Upgrade

Created by:: DAVID L. HUTCHINSON



1. CP 3152 - 63-454-00-5350 20 hp 275 mm
2. CP 3152 - 63-454-00-5360 23 hp 275 mm

APPENDIX B
TECH MEMO:
STRUVITE ANALYSIS AND RECOMMENDATION

Bowen Collins
& Associates, Inc.
CONSULTING ENGINEERS

TECHNICAL MEMORANDUM-DRAFT

DATE: January 20, 2016

TO: Mr. Lawrence Burton
Plant and Collections Manager
Orem City Municipal Corp
1450 W 550 N
Orem, Utah 84057

FROM: Keith Larson, P.E., Boris Petkovic, P.E.
Bowen, Collins & Associates
154 East 14000 South
Draper, Utah 84020

PROJECT: Orem City Master Plan

SUBJECT: Task 8: Struvite Analysis and Recommendation

INTRODUCTION

As part of the Orem City Sewer Master Plan, City of Orem has requested that Bowen, Collins and Associates (BC&A) evaluate methods to control struvite formation within the City's water reclamation facility (WRF). Struvite formation has been a problem the facility experienced in the past in some of the plant's solids handling processes. The purpose of this memorandum is to provide an overview of existing struvite formation in the WRF's solids handling processing facilities and to provide a general evaluation and recommendations for potential struvite mitigation alternatives.

Struvite (MgNH4P04 ·6H20)—also referred to as magnesium ammonium phosphate (MAP) —is a hard crystalline mineral which is formed by the reaction of magnesium, ammonium and orthophosphate as shown in Equation 1.

$$Mg^{2+} + NH_4^{+} + PO_4^{-3} + 6H_2O \rightarrow MgNH_4PO_4 \cdot 6H_2O \qquad \text{(Equation 1)}$$

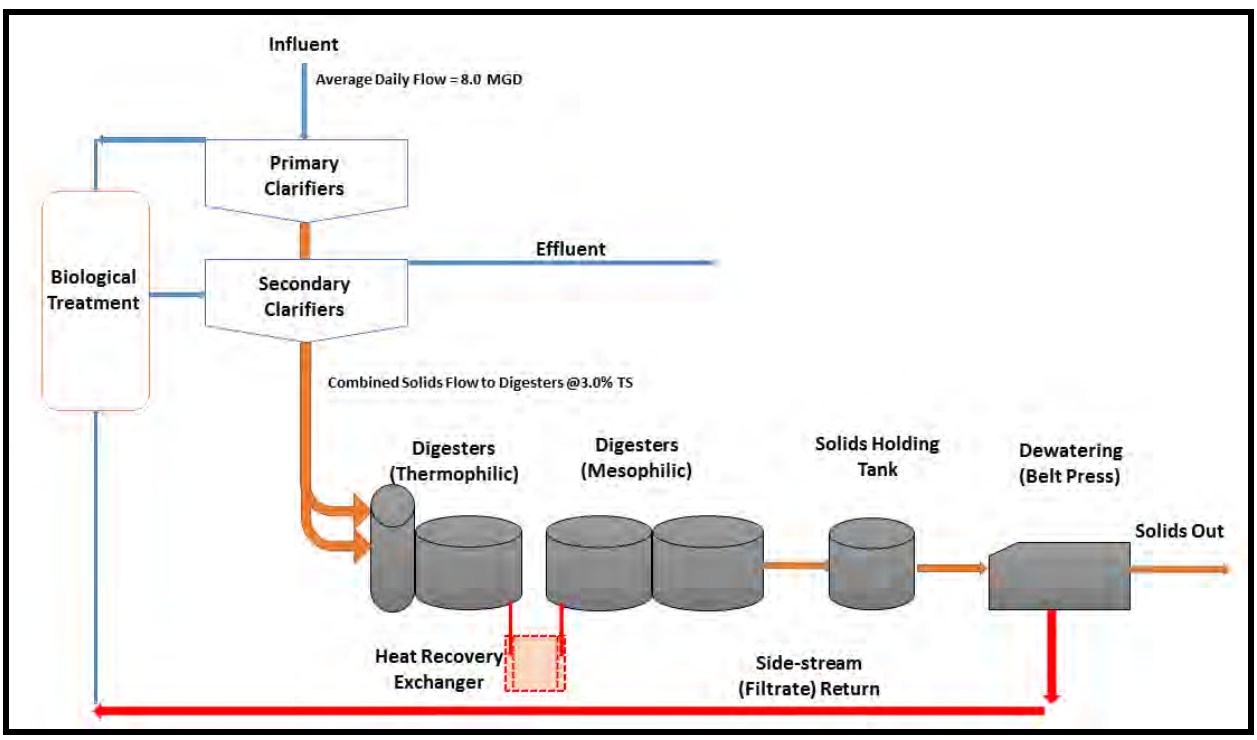
Struvite can precipitate whenever the product of the constituent activities (magnesium, ammonium, and phosphate) exceeds the oversaturation condition. Precipitation then ensues until equilibrium conditions are reached. Conditions affecting struvite solubility include concentrations of the three constituent ions, solution pH, temperature, and ionic strength. The struvite saturation condition, and therefore precipitation can be controlled by altering one or more of these conditions.

Struvite formation has been shown to occur in solids processing facilities (anaerobic digesters, solids processing piping, side stream piping) at a large number of wastewater treatment facilities. Formation of struvite is even more common at wastewater treatment plants that use biological nutrient removal (BNR) for phosphorous removal due to the increased phosphorous concentration in the secondary treatment waste sludge (WAS). Localized formation of struvite has been commonly observed at elbows of piping and suction sides of pipes. The cause for this is the increase in pH resulting from the release of Carbon Dioxide (CO_2). In pipe elbows and pump suction lines, this is due to reduction in pressure that causes release of CO_2 from the solution resulting in an increase of pH in the solution. In the case of side stream, the exposure of sludge to atmospheric conditions causes a portion of CO_2 to be released from the solution increasing the pH.

HISTORICAL OCCURRENCE OF STRUVITE AT THE OREM WRF

Figure 1 presents a simplified process flow diagram of solids processing at the Orem WRF. Orem WRF utilizes a two-phase (thermophilic/mesophilic) anaerobic digestion process for the stabilization of biosolids. The digesters are fed with a mixture of primary solids and Waste Activated Sludge (WAS) from the primary and secondary clarifiers respectively. Following digestion, solids are fed from a sludge holding tank at a rate of 400 gallons per minute (gpm) to the filter belt presses. Typically, solids are dewatered to a solids concentration of 15 percent. Liquid removed during the dewatering process (filtrate) is returned to the headworks building.

Figure 1
Solids Processing Flow Diagram at the Orem WRF (items shown in red indicate historical occurrence of struvite)



Historically, Orem WRF has experienced an accumulation of struvite in the belt press sludge dewatering process building and sludge-to-sludge (heat recovery) heat exchangers for the digesters.

In the dewatering building struvite accumulation was primarily noticeable on the concrete walls and floor directly beneath the belt press equipment. The operations staff has inspected the common area drain and piping to which the belt press equipment discharges. A video of the inspection has been provided and shows that only a slight accumulation occurs in the corners and bends of the pipeline in the form of discoloration. No significant accumulation was visible. In the past, there has been a monthly effort put forth to remove the accumulation that develops in the belt press area.

Accumulation of struvite in the sludge-to-sludge heat exchanger for the digesters has been most troublesome for the operations staff. In order to control the accumulation of struvite deposition, operation staff was forced to shut down the heat exchanger once a month to disassemble and clean. This process typically takes two days to complete with the effort of three personnel. Indication of the need to clean the system has historically been based on observation of pump performance. Reduction in pipe flow capacity was resulting in an increase in pump TDH signaling the accumulation of struvite and the need for cleaning. The amount of struvite that has been collected during these cleaning events is typically less than two cubic feet.

Figure 2
Struvite Accumulation on Heat Exchanger Piping

The operations staff is not aware of any other locations within the plant that may have struvite accumulation forming.

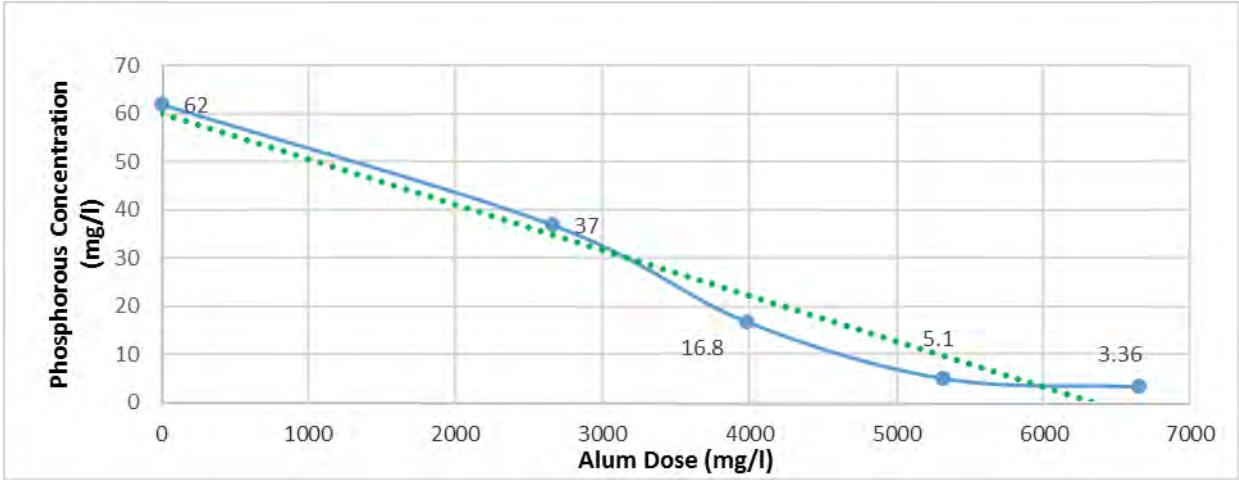
Current Struvite Mitigation Measures

In the last couple of years, Orem WRF staff has been very proactive in their efforts to control the struvite accumulation and has been using chemical addition at the dewatering building and thermophilic digester building. Chemical addition typically targets one of the main struvite components or alters the pH of the solution to prevent formation of struvite. At Orem WRF specifically, Aluminum Sulfate (Alum) addition is used which prevents formation of struvite by binding a portion of PO_4 ions (Equation 2) therefore preventing the saturation conditions to develop.

$$Al^{3+} + H_nPO_4^{\,3-n} \leftrightarrow AlPO_4 + nH^+ \qquad \text{(Equation 2)}$$

Prior to starting chemical addition, Orem WRF staff was assisted by Thatcher Chemical in performing limited bench testing on the sludge to establish a relationship between the Alum dose and the removal of Phosphorus. The developed dosing curve is shown in Figure 3. It is noted that the established curve is merely an approximation due to varying sludge conditions and limited number of samples.

Figure 3
Alum Dose vs. P Concentration Curve (Thatcher Chemical)



Alum dosing systems are installed in the thermophilic digester building and dewatering building in the vicinity of equipment where formation of struvite has been historically observed. According to the staff, the plant currently receives a delivery of approximately 4,000 gallons of Alum per month to control the formation of struvite. Based on the capacity of the existing chemical metering pumps and length of operation the Alum consumption at the two locations is estimated as follows;

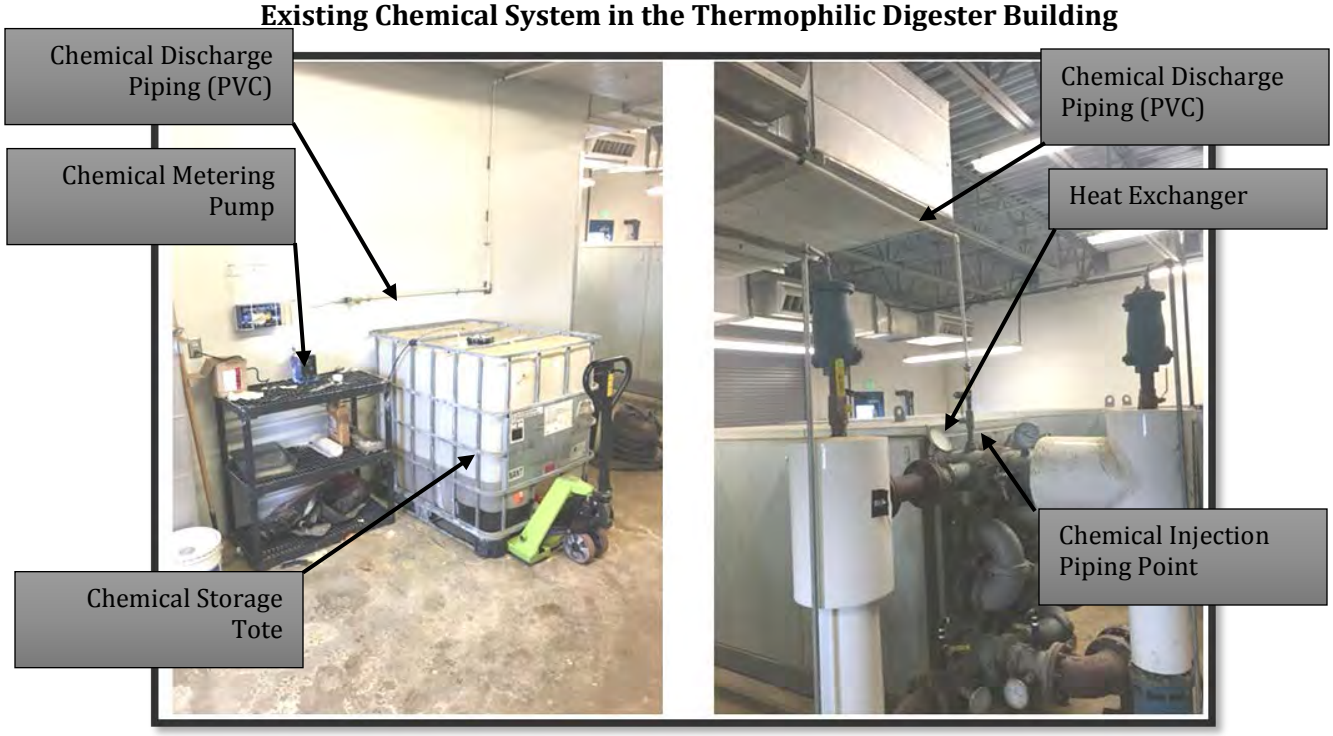
- Thermophilic Digester Building – (Weekly operation=168 hours) X (Existing pump capacity = 1.25 GPH) = 210 gallons per week (900 gallons per month).
- Dewatering Building – (Weekly Operation = 45 hours) X (Existing pump capacity = 10 GPH) = 450 gallons per week (2,000 gallons per Month)

There appears to be a relatively large discrepancy between the amount of Alum delivered to site (4,000 gallons per month) and what the theoretical operational consumption is (2,900 gallons per month). Some of the discrepancy may be attributed to variable length of operation of belt presses ,accidental spillage and leaks, and lack of pump calibration. For the purpose of this evaluation the actual quantity delivered on site is used to develop the operational costs.

Thermophilic Digester Building Chemical Addition System

The chemical addition system installed in the thermophilic digester control building is relatively simple but fully functional. It consists of a metering diaphragm pump with a capacity of 30 gallons per day (GPD), 275-gallon chemical storage tote, two isolation ball valves installed on pump discharge piping and chemical injection point, and PVC discharge piping. At this location, Alum is continuously fed into the sludge piping of the heat recovery heat exchanger. The chemical storage tote is replaced typically on a weekly basis. Notable pulsation of the diaphragm pump suction and discharge was observed during the site visit and also evidence of small alum spills on the floor. No containment for the stored chemical is provided.

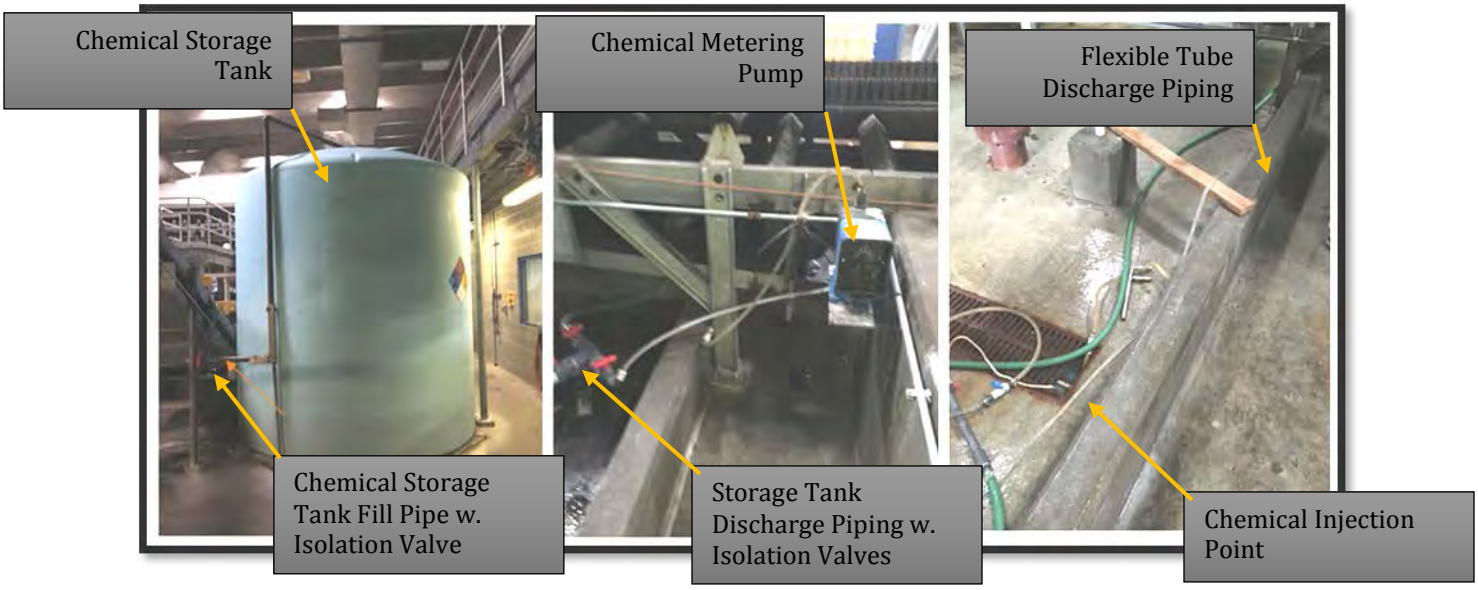
Figure 4
Existing Chemical System in the Thermophilic Digester Building



Dewatering Building Chemical Addition System

Likewise, a simple and functional chemical addition system is found in the dewatering building. It consists of a metering diaphragm pump with a capacity of 240 GPD, 6,000-gallon chemical storage tank, chemical storage tank fill line, two isolation ball valves installed at tank discharge, and flexible tube discharge piping. No containment for the relatively large storage tank is provided. Evidence of prior minor spills is visible on the floor around the tank.

Figure 5
Existing Chemical System in the Dewatering Building



In both locations the injection of Alum at the current dose appears to be effective and has significantly reduced the amount of effort necessary for maintenance. According to the staff, during the annual inspections there was no significant struvite accumulation observed in the heat exchanger and no accumulation was observed in the dewatering building.

Current chemical addition has an associated chemical cost of $4,600 per month. Based on the current operation, the cost per area is $1,400 and $3,200 for the digester and dewatering buildings respectively.

DESCRIPTION OF STRUVITE CONTROL ALTERNATIVES

BC&A, with input from plant personnel, has identified four options for struvite formation control.

- Chemical Addition
- Controlled Struvite Generation
- Sludge/ Sidestream Dilution
- "Do nothing"

The evaluation of alternatives is based on the current plant average daily flows of 8.0 Million Gallons per Day (MGD) and limited plant solids sampling and test data. It is noted that that none of the alternatives guarantee struvite prevention in the entire solids handling system. Consequently, alternatives are evaluated based on the potential to prevent struvite in locations of historic formation in the plant. As a result, the capital costs and operational costs developed during this evaluation may not cover all equipment and actives required to mitigate potential unidentified struvite accumulation throughout the plant's solids handling system.

ALTERNATIVE 1 - Chemical Addition

This alternative assumes that the City will continue with what appears to be a successful practice of Alum addition at the existing locations as a long term solution. If this alternative is implemented, improvements to the current chemical addition system should be made to ensure continuous prevention of struvite formation, to provide operational redundancy, optimize the system (operating cost reduction), and improve operator safety.

Following equipment and operational modifications are identified for this alternative;

Thermophilic Digester Building

Operational Modifications:

Based on the current chemical addition results, current Alum dose appears to be sufficient to prevent struvite accumulation in the heat recovery heat exchanger. The practice of filling the chemical storage totes in the dewatering building and transferring the totes to the digester control building seems to be somewhat labor intensive and provides opportunities for accidental spills. Appropriate training, safety, and spill prevention procedures need to be established to minimize the risks associated with Alum transfer.

Equipment and Layout Modifications:

Chemical dosing pumps - City is currently using a single diaphragm metering pump manufactured

by Pulsafeeder for addition of chemicals to the sludge piping. These are suitable pumps for this application. Following improvements to existing pumping system are recommended:

- **Installation of Automatic Pumps** - The existing pumping system could be improved by installing pumps that allow for automated operation and integration with the SCADA system. Pump integration would allow the staff to remotely monitor and control the pumps.

- **Pump Redundancy** - The current single pump installation does not provide any redundancy. While the redundancy in this particular application is not critical, a redundant pump would provide some operational flexibility.

- **Addition of pump appurtenances** - Typical diaphragm pump installation includes pulsation dampeners and calibration tubes that allow for optimization and also minimize pump maintenance and potential replacement costs.

A simple way of obtaining a pumping system that would include all the improvements listed above is to purchase a pre-assembled pump skid directly from the pump manufacturer like Pulsafeeder.

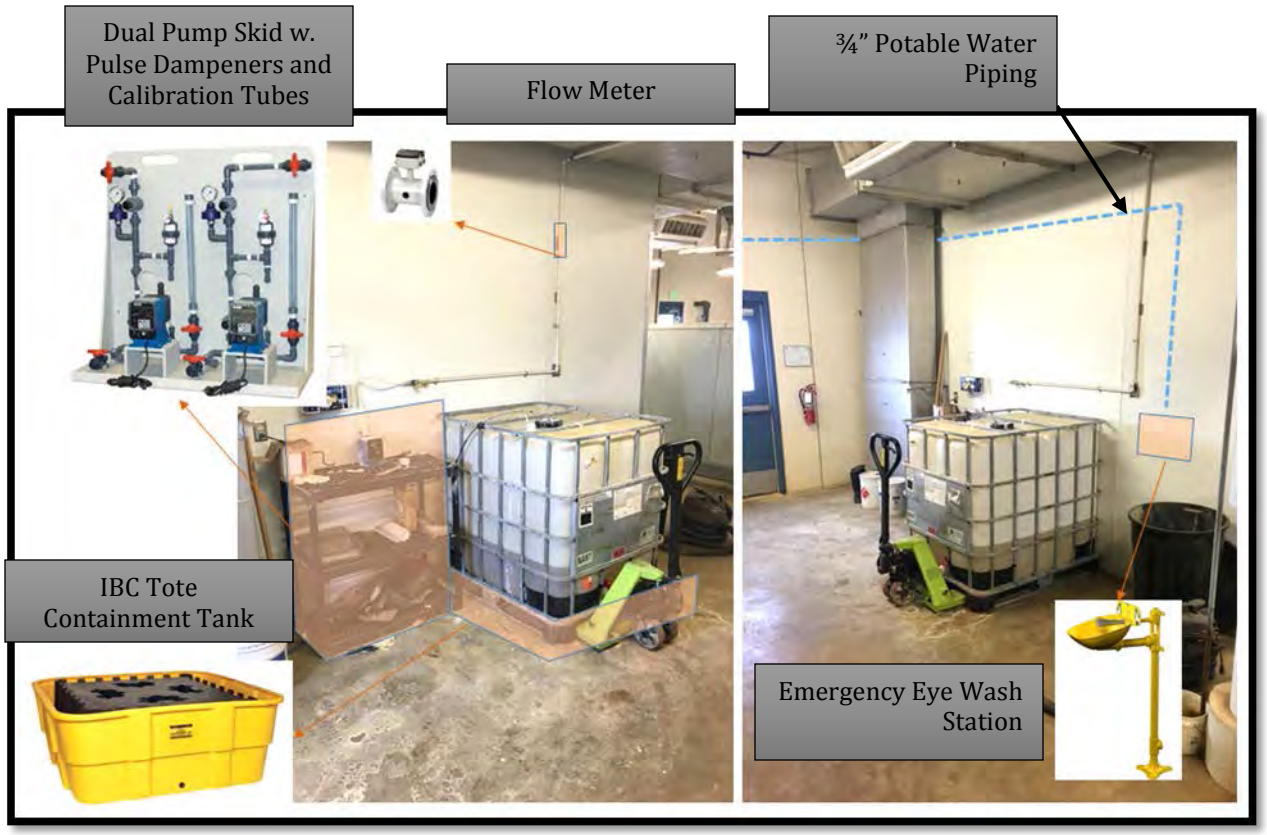
Flow Meter – Installation of a flow meter on the chemical pump discharge line would provide information to staff regarding the chemical rate of flow and quantity of chemical used.

Piping Modifications - Minor piping modifications would be required in order to accommodate the installation of flow meters and other equipment that may be added. Assuming that a skid pumping system is added, minor modifications to existing discharge piping would be required. Schedule 80 PVC piping is commonly used for this application. At this location consideration should be given to use of containment (double wall) piping to avoid potential damage to building wall. A flexible hose connection between the Alum storage tote and the skid suction piping is recommended.

Containment – Liquid-chemical storage areas should include secondary containment for both catastrophic and minor leaks. Containment volume should be a minimum of the largest bulk storage tank volume plus an additional 10 percent. Liquid Alum is a corrosive acid salt and currently Alum is stored in an area which does not provide any containment in case of a spill. A simple polyethylene containment base for the storage tote may be purchased to provide adequate containment of the liquid in case of a spill.

Emergency Eyewash Station – An emergency eyewash station can be installed adjacent to the Alum storage tote to provide for immediate means of treating accidents. Potable water line would need to be extended approximately 50 feet from the northeast corner of the building. Alternatively, a portable eyewash unit that requires no plumbing could be mounted on the wall to avoid the extension of potable water piping.

Figure 6
Potential Improvements to the Existing Chemical Addition System in the Thermophilic Digester Control Building



Dewatering Building

Operational Modifications:

Current Alum dose appears to be sufficient to prevent struvite accumulation in the dewatering building. Potential operational modifications that have been identified are limited to providing system automation, which would allow remote monitoring and control of pumps, and result in reduced operator attendance requirements.

Equipment and Layout Modifications:

Storage tank – The original dewatering building design did not anticipate the need for additional Alum storage space. Although a chemical containment area exists in the building, this space is occupied by Sodium Hydroxide and Polymer Storage tanks. Consequently, plant staff had few options when installing the current Alum storage tank. As a result, some deficiencies are identified;

> **Containment** – No specific secondary containment is provided for this storage tank. Due to the location of a nearby floor drain potential damage caused by minor spills would be limited to a relatively small area. In order to provide the containment volume, most likely a smaller storage tank would need to be installed to allow for the construction of a concrete

containment wall.

Tank Level Indicator and Measurement – A simple reverse level float tank gauge may be installed to allow visual indication of tank level on the exterior of the tank. If a new tank is installed, an ultrasonic level meter may be included that would allow for level measurement and could also be interlocked with an alarm in case of tank leakage.

Seismic Tank Restraints - Typical new chemical storage tank installations in seismic zones include seismic tank restraints. If a new tank is to be installed seismic restraints would be included.

Chemical dosing pumps – Similar to the digester control building, metering diaphragm pumps are used to add the chemicals to the system. Following improvements are identified;

- **Installation of Automatic Pumps** - The current pumping system could be improved by installing pumps that allow for automated operation and integration with the SCADA system to control and monitor the pumps remotely.

- **Pump Redundancy** – The existing installation does not provide any redundancy. While the redundancy in this particular application is not critical, a second, redundant pump would provide some operational flexibility.

- **Addition of pump appurtenances** - Typical diaphragm pump installation includes pulsation dampeners and calibration tubes that allow for optimization and also minimize pump maintenance and potential replacement costs.

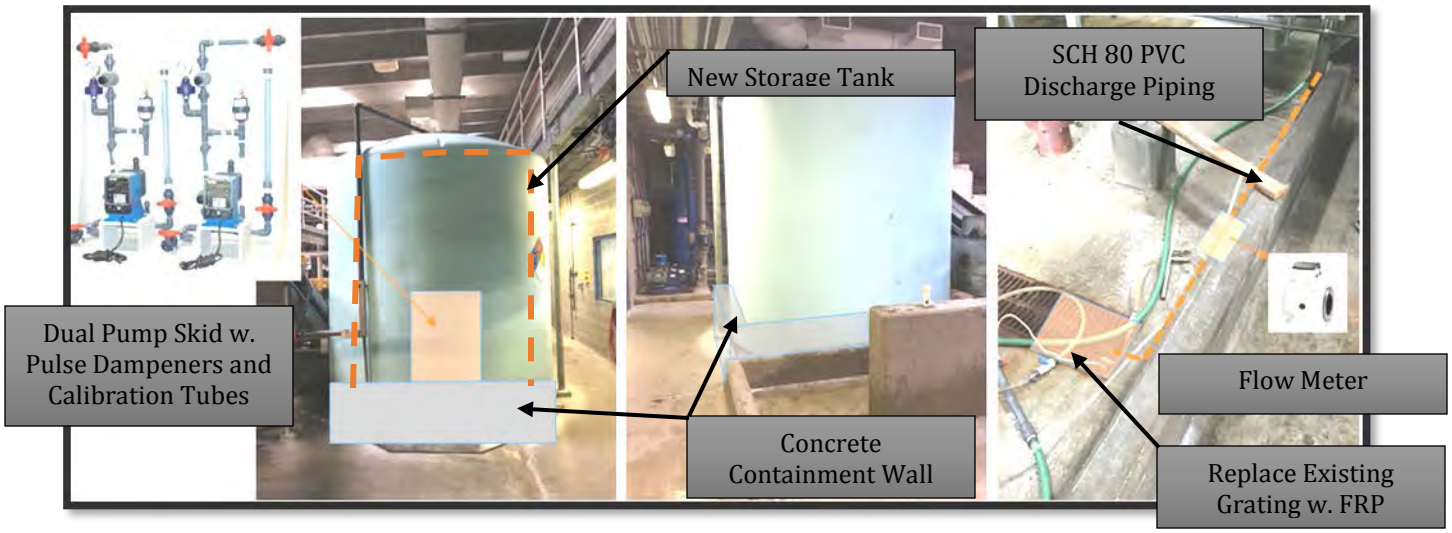
Flow Meter –Installation of a flow meter would provide information to the staff regarding the flow rate and a degree of control.

Piping Modifications – Modifications to existing chemical addition piping would be required in order to accommodate the installation of flow meters and other equipment. At a minimum the flexible hose discharge piping should be replaced with schedule 80 PVC piping that would be routed on the inside of the existing belt press containment wall and adequately supported with fiberglass reinforced plastic (FRP) strut type pipe supports.

Electrical and SCADA Integration – The scope and complexity of electrical work and integration will be dependent on the final selection of equipment. At a minimum the system should allow remote control and monitoring of pumps and allow for automatic operation of chemical addition pumps based on the belt press operation.

Non-Metallic Drain Channel Grating – Consideration should be given to replacing a portion of the existing metal grating at the chemical injection location with FRP grating. This would be a cosmetic improvement and is not critical to the process.

Figure 7
Potential Improvements to the Existing Chemical System in the Thermophilic Digester Control Building



ALTERNATIVE 1 Cost Evaluation

Capital Cost

The capital costs associated with this alternative are estimated at $20,000 and $55,000 for the digester and dewatering buildings respectively. The cost of improvements for the dewatering building includes the installation of a new Alum storage tank and construction of a containment wall. Due to scope and complexity of modifications, for this location the cost of alternative also includes a contractor markup of 10 percent. All costs include a 30 percent contingency. A detailed breakdown of costs is included in Tables 1 and 2 in the Appendix.

Operational Cost

In order to provide a relative cost for the evaluation and comparison with other alternatives, an operational cost associated with chemical and power use, labor costs, and periodical equipment replacement requirements was developed and estimated at $70,200. A detailed breakdown of operational and maintenance costs for this alternative is included in Table 3 in Appendix.

ALTERNATIVE 2 - Controlled Struvite Generation

An alternative method of struvite accumulation prevention is controlled struvite generation. With this approach, rather than preventing struvite from forming in the digesters, digested sludge piping, or dewatering equipment, struvite is preferentially precipitated in a specific location. There are several different technologies currently using this concept for struvite mitigation. The main differences between technologies are generally the location of the reactor, i.e. where the struvite is precipitated in the solids handling process, and the extent of treatment within the reactor. Based on the extent of treatment in the reactor, two different processes are recognized: struvite harvesting and struvite precipitation. In struvite harvesting the final product is a relatively clean, marketable fertilizer. With struvite precipitation approach, the extent of treatment is limited to

controlled precipitation of struvite in the reactor. Following the precipitation, struvite in form of small crystals is retained in the sludge through dewatering and final disposal.

Proposed System Description

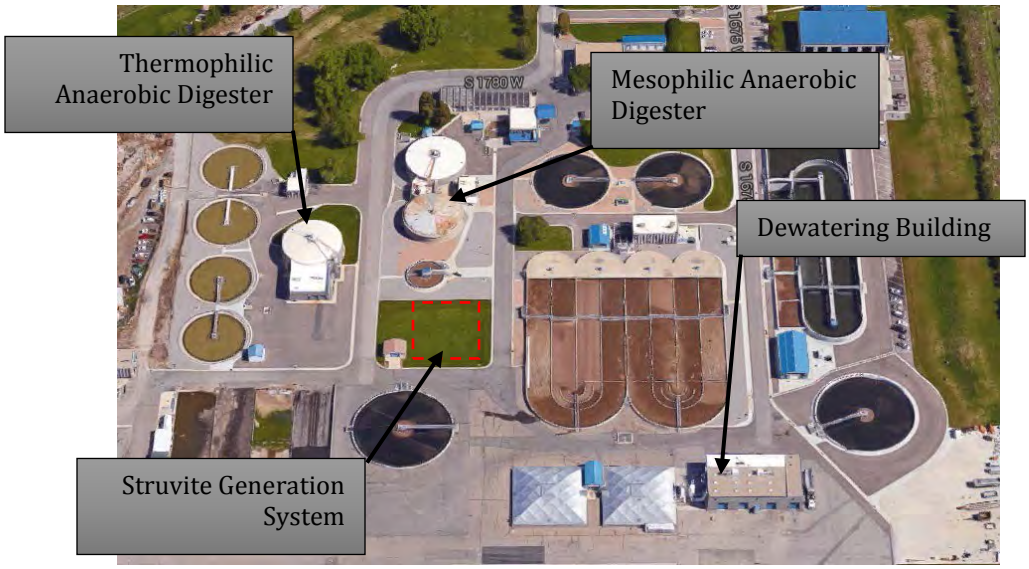
For Orem WRF the proprietary AirPrex technology by CNP was identified as a viable technology for controlled struvite generation. The AirPrex system is a complete sludge optimization and struvite generation system that's installed between anaerobic digestion and sludge dewatering steps. Controlled struvite precipitation is regulated by air stripping in the AirPrex reactor with the addition of a magnesium chloride ($MgCl_2$). This technology is applicable to treatment of digested sludge prior to dewatering and not just the side stream (filtrate). As a result, struvite formation prevention is provided for solids handling processes downstream of the AirPrex system. In addition, CNP claims that due to removal of Phosphorus upstream of dewatering equipment, the AirPrex system would also provide potential benefits in cake dryness improvements (3 to 4 percentage points) and polymer use reduction of 10 to 20 percent.

For the specific application at Orem WRF, the struvite harvesting level of treatment currently does not offer any benefits. Consequently, the analysis of this option is focused on a system that would be limited to struvite precipitation and removal through disposal of sludge.

The size of the AirPrex struvite generation system is determined by the required sludge throughput and the need to maintain continuous operation. Currently, Orem WRF is dewatering 0.76 Million gallons of digested sludge per week. For continuous operation this equates to a design throughput capacity of 75 gpm. In order to maintain the current weekly dewatering regimen, installation of AirPrex system would also require continued operation of the existing solids holding tank.

Potential location for the installation of the AirPrex system at the Orem WRF is identified in Figure 8. This location provides enough space for the installation of required facilities and is in the vicinity of the current dewatering facility sludge feed piping.

Figure 8
Potential Location of Struvite Generation Process



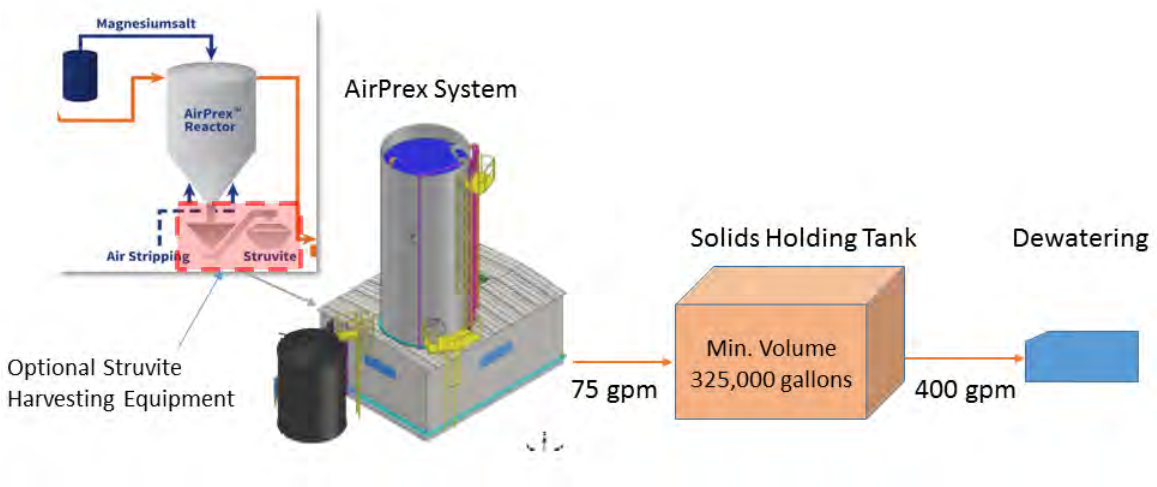
Based on the proposal from CNP, the AirPrex struvite generation system would include the following equipment:

- Reactor Tank by (15-foot diameter by 40 feet high)
- Blower and air distribution system for the reactor
- $MgCl_2$ storage and dosing system
- Defoamer dosing system
- Internal piping for air distribution, chemical supply, and sludge handling
- Chemical dosing and sludge pumps
- Instrumentation and control

In addition to items provided by the system supplier, a CMU or Metal Building to house the blowers, chemical dosing systems, and system pumps would also be required for a successful installation. The building size is estimated based on the information provided by the manufacturers at 40 by 30 feet.

Figures 9 illustrates a typical flow diagram for the installation:

Figure 9
Struvite Generation Process Flow Diagram



In order to harvest the struvite for potential profit, it would be necessary to include additional grit washing and classification equipment as well as solids storage and containment/packaging equipment for the final harvested product.

<u>Capital Costs</u>

The capital costs associated with this option are estimated at $ 2.2 Million. This cost includes a 30 percent contingency and contractor markup of 10 percent. An additional cost of $400,000 would be added for the struvite harvesting equipment. A detailed breakdown of costs is included in Table 4 in the Appendix.

Operational Costs

In addition to the capital cost required to construct the struvite generation facility, the controlled precipitation of struvite would include following operational costs:

Magnesium salt addition (Chemical Cost) - Current AirPrex proposal indicates that for a digested sludge flow of 75 gpm at 3% solids content, 91 gallons per day of $MgCl_2$ at 33% concentration is required. Presently, $MgCl_2$ has a purchase cost of $0.45 per gallon (including freight to the plant). At this rate, the consumption of chemical for struvite precipitation would be approximately $41.0 per day of operation of the AirPrex system. This equates to an annual cost of $15,000 for the chemical.

Electrical costs – The two main electrical costs are associated with the Air Prex system blowers and pumps. An estimated 350 kwH per day will be used for the struvite generation system. At the current cost of $0.08 per kwH the annual cost is $10,500.

Labor costs – It is assumed that 1 hour per day will be required to ensure proper operation of the AirPrex System. This equates to an annual cost of $15,600 assuming a labor rate of $60.00 per hour.

Equipment replacement costs – For the purpose of this evaluation it is assumed that the blowers and pumps will require replacement once during the assumed 20-year useful life. On an annual basis this cost is estimated at $5,000.

No cost savings associated with potential benefits in cake solids content increase and polymer use reduction is assumed.

The total estimated annual operation and maintenance cost for this alternative is estimated at $46,100. Table 5 in Appendix provides a summary of the annual operational cost associated with the AirPrex system.

ALTERNATIVE 3 - Dilution

For Orem WRF this alternative would involve the addition of plant effluent (or utility water) to the sludge stream just upstream of dewatering belt presses or directly into the common filtrate drain. Dilution in the heat recovery heat exchanger loop is not recommended as it would add substantial amounts of liquid to the digesters and result in adverse process conditions and upset the digester heating balance.

Dilution is a proven method for targeted control of formation of struvite which typically targets one or multiple factors that are required for struvite formation. Addition of a diluting liquid typically results in reduction in concentration of constituent's ions, adjustment of pH level or temperature of incoming sludge or sidestream. However, extensive testing is required to determine the required dilution factors due to the specific chemistry of the sludge/sidestream, temperature variations, pH conditions, and chemical properties of diluting liquid itself.

Based on a general review of available data for plants that are implementing this method as a means of struvite mitigation, dilution flows of 0.2 to 1.2 times the sludge or sidestream flow have been needed to prevent struvite formation. For example, Central Valley Water Reclamation Facility (CVWRF) has been successfully applying this approach at their dewatering facility for a couple of years now. In their particular case, addition of a relatively low dilution flow of 30 gpm to the sludge

flow of 160 gpm (factor of 0.2) is required to prevent struvite formation in the belt press. Furthermore, in case of the CVWRF, no increase in polymer use or an increase in the belt press length of operation as a result of the additional flow was observed.

For the purpose of this evaluation, it is assumed that the dilution flow at current conditions for Orem WRF would not exceed 200 gpm (additional 100 gpm per belt press). At this dilution flow rate, if the dilution flow is added directly into sludge piping, the actual flow sent to the belt press would be 300 gpm which is the maximum hydraulic capacity of the belt press and theoretically would not result in longer belt press operating times or additional polymer use. Alternatively, if the dilution water is added to the common filtrate drains directly, there would be no impact to belt press operation.

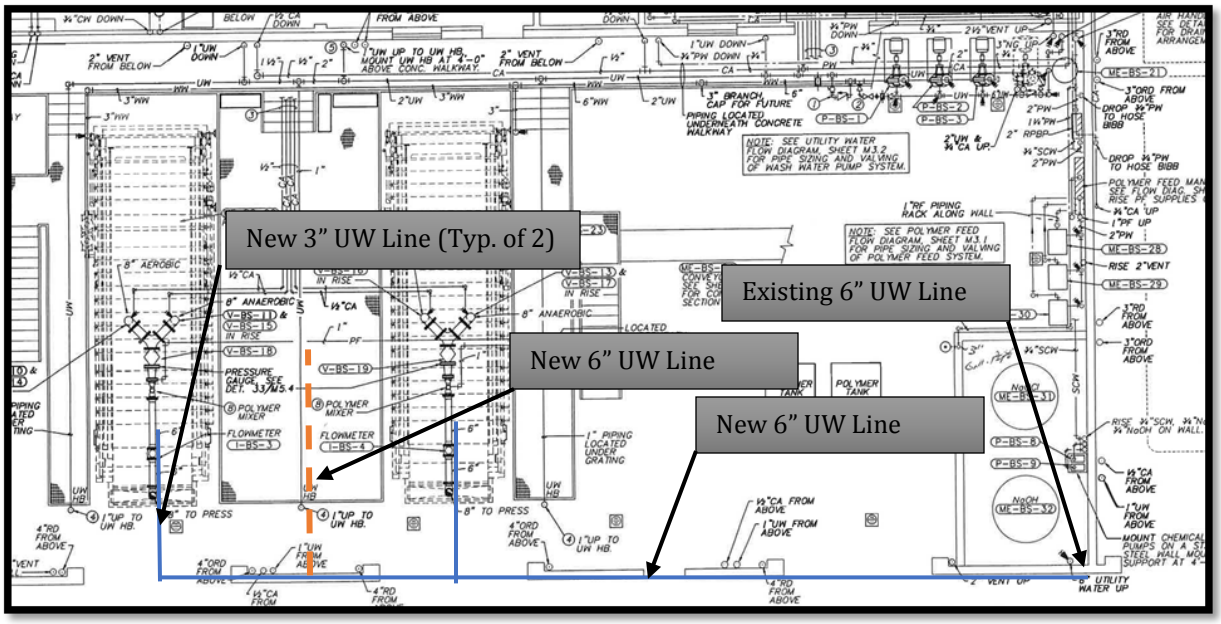
Operational Modifications:

No operational modifications relative to current belt press operations are expected as long as the dilution flow rate is such that the belt press hydraulic capacity is not exceeded or the dilution liquid is added into the common filtrate drain.

Equipment and Layout Modifications:

At low dilution factors the existing 6-inch utility water line providing utility water to the dewatering building is assumed to be adequate to provide additional flows. At a minimum, this line would need to be extended as shown in Figure 10. Also, two new 3-inch lines or a single 6-inch line with flow control, check valves, and flow meters would need to be installed to provide the dilution water to individual belt presses or common filtrate drain respectively. The capacity of existing 12-inch drain piping in the building should be adequate to handle the additional flows and no modifications are anticipated. Potential effect of this new demand on the plant's utility pumps was not evaluated.

Figure 10
Dilution Alternative Piping Modifications



Capital Costs

The capital cost associated with this option is estimated at $31,000 with an assumption that the existing utility pumps can provide the dilution water without any modifications. Capital cost includes the cost of piping upgrades including flow meters, valves, and fittings and a 30% contingency. A detailed breakdown of costs is included in Table 6 in the Appendix.

Operational Costs

As long as the dilution flow rate and sludge feed to the belt press does not exceed the hydraulic capacity of the belt press, the only expected operational cost, would be the fractional increase in the power usage due to the larger demand on the utility water pumps. This cost is estimated at $400 per year. Relative to the current costs of maintaining the wash water system and belt presses no additional maintenance cost would result from implementing this option.

ALTERNATIVE 4 - Do Nothing

A "do nothing" approach would discontinue dosing of alum and allow for the formation of struvite within the system to resume. This would result in an increase in O&M costs to maintain equipment and utilize staff efforts. Additionally, long periods of system downtime would be required.

Operational Modifications

Historically, once a month it has taken operations staff two days to shutdown, disassemble, and clean equipment impacted by struvite accumulation. In order to proceed with this option, the City would need to establish a regular inspection and maintenance schedule and allocate staff for these tasks.

Equipment and Layout Modifications:

With his approach no equipment and layout modifications are required.

Operational Costs

The effort of removing struvite accumulation has historically consumed two days of three operator's work hours which equates to 48 man hours and approximately $2,880 per month. Over a twelve- month period this accounts for up to 576 hours and annual cost of $35,300. This cost also accounts for the necessary disposables such as tools and PPE, and the addition of sodium aluminate to the heat exchangers to aid in the breakup and removal of the struvite formations. This cost does not account for the additional wear and tear of process pumps, equipment, and piping resulting from struvite accumulation and cleaning. This cost also does not account for the potential reduction of maintenance efforts for other plant systems as a result of personnel and resources being allocated to struvite control measures.

DISCUSSION AND ALTERNATIVE EVALUATION SUMMARY

Implementing any of these alternatives for struvite formation control should be done after understanding and recognizing the associated costs and operational implications. Table 1 provides a summary of capital, operation, and life cycle costs for evaluated alternatives.

Table 1
Alternative Evaluation Cost Summary

	Chemical Addition	Controlled Struvite Generation*	Dilution*	"Do Nothing"
Total Capital Cost	**$75,000**	**$2,161,950**	**$53,500**	**$0**
Annual Operation Cost Total	**$70,200**	**$70,500**	**$24,800**	**$35,300**
NPV -20 Years	**$1,120,000**	**$3,211,000**	**$422,500**	**$525,000**

***Includes life cycle costs associated with capital cost and operation costs of chemical addition system in the thermophilic digester building.**

The current practice of chemical addition offers a relatively simple but effective way of struvite control. It provides struvite control at specific areas where formation was historically observed. Another benefit of chemical additional approach is the system simplicity, familiarity of the staff with this system, and the potential complimentary effect on future Phosphorous effluent limits. Biggest disadvantage of the chemical addition alternative is the high cost of chemical. Due to high chemical cost, this alternative has the highest annual operation costs of all evaluated alternatives. The capital costs associated with this alternative are relatively low and if implemented would result in a more efficient operation both from labor and chemical use perspective.

Biggest advantage of the controlled struvite generation alternative is that it would result in prevention of struvite formation in solids handling systems downstream of this process and relatively low annual operation costs. Additionally, there may be operational cost savings that could result from a potential reduction in polymer usage in the dewatering and process efficiencies. Similar to the chemical addition alternative, struvite generation would be beneficial in its ability to effectively remove significant quantities of Phosphorus from the plant through solids disposal. The obvious disadvantage of this alternative is the high capital cost. Another disadvantage of this alternative is that it may have no or limited effect on the struvite accumulation in the existing heat recovery heat exchanger. Consequently, with this alternative the practice of chemical addition or monthly cleaning at the heat recovery heat exchanger would need to be continued.

Dilution alternative is very intriguing as it potentially may prevent struvite accumulation at the belt press with minimum capital and operational costs. The biggest disadvantage for this option is the large degree of uncertainty associated with the required dilution flow rate. Extensive testing is required to establish the appropriate dilution rate and any changes in quality or quantity of sludge being sent to the dewatering belt press may affect the dilution rate. Furthermore, dilution at the belt press would not prevent struvite accumulation at the heat exchanger or any upstream solids handling equipment. Therefore, with this alternative too, the practice of chemical addition or monthly cleaning at the heat recovery heat exchanger would need to be continued. Unlike the chemical addition and struvite generation alternatives, this alternative would provide no benefit in removal of additional quantities of Phosphorous through solids disposal. Finally, with this option approximately 100,000 gallons of already treated water would be returned to the front of the plant.

As shown in the table, the "do nothing" alternative is the lowest in capital cost but has high maintenance costs and very high risks associated with equipment repairs, piping, and valve replacements that should be considered. This approach also increases the potential of struvite

accumulation in other plant systems where maintenance may not be feasible or difficult (for example common filtrate drain piping). Additional accumulations could require emergency replacement of pipes, valves, or other costly plant infrastructure and equipment.

Table 2 provides a summary of general advantages and disadvantages of evaluated alternatives.

Table 2
General Alternative Evaluation Summary

Struvite Mitigation Option	Advantages	Disadvantages
Chemical Addition	• Proven results for struvite control in targeted areas • Common struvite control approach • Relatively simple system and operation • Staff familiarity with the process • Low system maintenance • Positive effect on potential chemical addition for P effluent limits	• High operation cost • Moderate capital cost
Controlled Struvite Generation	• Struvite accumulation prevention in areas downstream of system • Moderate operation costs • Potential increase in cake solids content • Potential for lower polymer consumption • Positive effect on potential chemical addition for P effluent limits	• High Capital Cost • Alum addition at Heat Recovery Heat Exchanger would need to be continued.
Dilution	• No chemical costs • Low capital cost • Potentially low operations cost	• Struvite accumulation prevention is limited to belt press • Alum addition at Heat Recovery Heat Exchanger would need to be continued • Extensive testing required to establish the dilution factor

		• Higher capital and operation costs will result from higher dilution factors • Increase in return flows to the front of the plant • No positive effect on potential chemical addition for P effluent limits
Do Nothing	• No Capital Cost	• Limited Struvite Control • High Labor requirements • High risk of struvite accumulation • Likely increase in equipment, piping, and piping appurtenances replacement frequency • No positive effect on potential chemical addition for P effluent limits

RECOMMENDATIONS

Bowen, Collins and Associates recommends the following actions be taken:

Orem City WRF should continue with the current practice of chemical (Alum) addition and:

- Implement chemical addition system modifications in the thermophilic digester building
- Implement limited chemical addition system upgrades in the dewatering building focusing on the pumping system upgrades and automation. Evaluate current chemical feed rates for alum to determine if a reduction in concentration can be made without formation of struvite in the system
- Consider a future centralized chemical storage and addition structure that would service the dewatering building and also house storage and chemical addition equipment for future effluent polishing
- Continue with regular inspections of areas with high potential for struvite formation and where struvite formation was historically observed
- Continue solids sampling (Total Suspended Solids, Total Phosphorus) for digester solids, dewatered cake and filtrate
- Future designs and pipe replacements should consider use of gradual flow transition fittings (long radius elbows) and the use of smooth walled piping (glass lined DIP, HDPE, etc) to minimize potential of struvite formation.

APPENDIX

ALTERNATIVE 1- Chemical Addition Costs

Table 1
Capital Cost - Thermophilic Digester Building

Item	Quantity	Unit	Unit Cost	Installed Cost
Chemical Addition Piping Modifications	30	LF	$50	$1,500
Flow Meter	1	ea	$2,200	$2,200
New Pump Skid	1	ea	$5,000	$5,000
Containment	1	LS	$1,300	$1,300
Emergency Eyewash	1	LS	$300	$300
Potable Water Extension	50	ea	$30	$1,500
Electrical Modifications/SCADA Integration	30%	-	-	$3,540
			Sub-Total	$15,340
			Contingency (30%)	$4,602
			Total	**$19,942**

Table 2
Capital Cost-Dewatering Building

Item	Quantity	Unit	Unit Cost	Installed Cost
Chemical Addition Piping Modifications	30	LF	$50	$1,500
Removal of Existing Tank and Demo	1	LS	$5,000	$5,000
Containment	4	cy	$1,500	$6,000
FRP Grating	50	sf	$10	$500
New Tank (4,000 gallons)	4000	gallons	$2	$9,000
New Pump Skid	1	ea	$6,000	$6,000
Flow Meter	1	ea	$2,200	$2,200
Instrumentation	1	ea	$2,500	$2,500
Electrical Modifications/SCADA Integration	30%	-	-	$9,810
			Sub-Total	$42,510
			Contractor Markup (10%)	$4,251
			Contingency (30%)	$12,753
			Total	**$55,263**

Table 3
Operation and Maintenance Cost- Chemical (Alum) Addition

Item	Annual Operation Cost (Dewatering Building)	Annual Operation Cost (Digester Building)
Chemical (Alum) Use*	$38,500	$17,000
Power Use	$50	$150
Labor Cost**	$6,250	$6,250
Replacement Cost***	$1,000	$1,000
SUB-TOTAL	$45,800	$24,400
		TOTAL COST = $70,200

*Alum cost of $411 per dry ton.
**Assumes one hour per week for regular maintenance of the system with a labor rate of $60.00/hour.
***Replacement of metering pumps every 5 years.

ALTERNATIVE 2 - Controlled Struvite Generation Costs

Table 4
Capital Cost – Controlled Struvite Generation (AirPrex System)

Item	Quantity	Unit	Unit Cost	Installed Cost
Civil Work	1	LS	$30,000	$30,000
Building (CMU)	1,200	sf	$150	$180,000
AirPrex Equipment	1	LS	$1,000,000	$1,000,000
Equipment Installation	1	LS	$100,000	$100,000
Instrumentation	1	LS	$20,000	$20,000
Electrical/Integration	1	LS	15%	$199,500
			Sub-Total	$1,529,500
			Contractor Markup (10%)	$152,950
			Contingency (30%)	$458,850
			Total	**$2,141,300**

Table 5
Operation and Maintenance Cost- Controlled Struvite Generation

Item	Annual Operation Cost
Chemical ($MgCl_2$) Use	$15,000
Power Use	$10,500
Labor Cost	$15,600
Replacement Cost	$5,000
TOTAL	**$46,100**

ALTERNATIVE 3 – Dilution

Table 6
Capital Cost- Dilution

Item	Quantity	Unit	Unit Cost	Installed Cost
6-inch pipe	100	LF	$50	$5,000
3-inch pipe	75	LF	$25	$1,875
Valves (6 inch)	2	ea	$400	$800
Valves (3 inch)	8	ea	$350	$2,800
Flow Meter	2	ea	$4,700	$9,400
Electrical Modifications/SCADA Integration	20%	-	-	$3,975
			Sub-Total	$23,850
			Contingency (30%)	$7,155
			Total	**$31,005**

Table 7
Operation and Maintenance Cost - Dilution

Item	Annual Operation Cost
Power Use	$400
TOTAL	**$400**

ALTERNATIVE 4 – Do Nothing

Table 8
Operation and Maintenance Cost - "Do Nothing"

Item	Annual Operation Cost
Chemical use	$500
Equipment	$200
Labor Cost	$34,560
TOTAL	**$35,260**

APPENDIX C
ROUTINE MAINTENANCE PROJECTS

Address	Distance, Direction, and Size	Problem, replace or liner.	Pay Off Period (Years)	Total
WELLS FARGO BLDG. 800 N.	Flush manhole	Lat. In m/h needs trough work (in progress).	0.13	$1,500
1450 S 895 EAST	Flush manhole	8" and 2- 4" lat. In m/h trough work allready tried	0.28	$1,500
997 NORTH 75 EAST	Flush	2-laterals into m/h, needs trough work (in progress).	0.28	$1,500
159 NORTH 1080 EAST	Flush manhole	3-laterals in m/h. Trough work ? (in progress)	0.28	$1,500
1100 SOUTH PALISADE	8" Lines	Low flows and off-set joint.	0.28	$1,500
1150 SOUTH 435 EAST	Flush manhole	4" lat. Into m/h. Needs trough work (In progress)	0.37	$1,500
555 WEST 1200 SOUTH	8" Line 376'	1200 s. trunk line blocks 8" line flow. Trough work ?	0.37	$1,500
1150 NORTH 910 EAST	8" Line 325'	Line in good cond. Roots in Lateral, point repair needed	0.37	$1,500
100 NORTH 800 WEST	8" 302'	Line has tree roots, point repairs needed.	0.37	$1,500
320 WEST 100 SOUTH	Flush manhole	4" lat. Into m/h. needs trough work (in progress)	0.56	$1,500
457 SOUTH 950 EAST	Flush manhole	Flush m/h,4" lat. In m/h. Trough work needed.	0.56	$1,500
413 NORTH OREM BLVD.	8" Line	Flush manhole, 8' ties into manhole (low flow)	0.56	$1,500
900 NORTH 70 WEST	6" Lines E-326'/S-689'	East line roots and break (Point repair) South line Lined	0.67	$1,500
450 NORTH 400 EAST	8" Line 237'	This line is in good cond. Found lite roots Trough work	1.11	$1,500
542 SOUTH 560 EAST	Flush manhole	Line Changes from 8" to 6" in manhole	1.37	$16,000
570 NORTH 1016 WEST	Flush manhole	Lateral comes into m/h, flush as needed. Trough work	1.67	$1,500
475 EAST 1140 SOUTH	8" line 148'	Line showing aggregation. "Liner"	2.08	$16,808
1150 SOUTH 500 EAST	8" line 150'	Line showing aggregation. "Liner"	2.09	$16,900
WEST ENTRANCE MACY'S+B52	8" line 275'	Line showing aggregation "Liner"	2.80	$22,650
400 SOUTH 800 WEST	Flush manhole	15"& 8" line into m/h. 15" plugs off 8" flow into m/h.	3.07	$16,560
NORTH ENTRANCE MACY'S	8" line 220'	8" line from north ties into 8" mall line.	3.22	$26,120
400 NORTH 725 WEST	6" line 389'	Multi. breaks, tree roots, prot. Lat. "Liner"	3.25	$26,338
500 NORTH MONT. DR.	8" 246'	Line in fair cond. Has severe bellies "replace"	3.75	$65,842
1800 SOUTH 400 EAST	8" line 679'	Line has several bad bellies. "Replace"	3.82	$41,234
200 NORTH STATE STREET	8" Line 260'	Line has aggregation "Liner'	4.07	$21,960
500 NORTH 360 EAST	8" line W-64'/6" line S-125'	S. line low flow (bellies) W. line agg. Showing "Liner"	4.62	$18,694
693 NORTH ATLANTIS dr.(150e)	6" Line 379'	Line has off-set joints,prot. lateral. "Liner"	4.80	$25,918
420 NORTH 950 WEST	6" Lines S-244'	North line replaced. East line lined. South line "Line"	4.87	$32,848
1500 NORTH 650 WEST	8" Line 215'	Line in good cond. Low flows, poss. Lining	4.91	$19,890
710 NORTH 100 WEST	6" Easement line 400'	Line @ min. grade, liner for flow.	4.96	$26,800
910 NORTH 200 EAST	E-6" W-8"	East line new (Skip Dunn) West line "Liner"	5.01	$20,304
310 NORTH 400 WEST	8" Line 225'	Line has lots of off-set joints. "Liner"	5.02	$20,350
500 NORTH 400 EAST	6" Line 247'	Line showing aggregation "Liner"	5.03	$20,374
300 WEST 1600 SOUTH	8" Line 237'	Line showing wear, has grease in it.	5.16	$20,902
150 NORTH 800 WEST	8" Line 420'	Line in good cond. with off-set joints.	5.43	$29,320
245 WEST 1600 SOUTH	8" Line 275'	Line showing wear, has grease in it.	5.59	$22,650
500 SOUTH 900 EAST	8" Line 300'	Showing severe aggregation. "Liner"	5.88	$23,800
1742 SOUTH 145 EAST FLUSH	Flush manhole	4 lat. Into m/h. Trough work done, flush as needed.	5.93	$16,000
1550 SOUTH 850 EAST	Flush manhole	8", 6", & 4" lat. Into manhole. Flushed as needed.	5.93	$16,000
1830 NORTH 600 WEST	Flush manhole	Trough work done, flush as needed.	5.93	$16,000
1500 NORTH 680 WEST	Flush manhole	3-lat. Into m/h. Trough work done, flush as needed.	5.93	$16,000
500 NORTH 680 WEST	Flush manhole	6" & 8" line in m/h. Flush as needed, trough work ?	5.93	$16,000
270 NORTH 1030 WEST	8" Lines. West line-138'	N & S lines good cond. West line needs "Lining"	6.01	$32,448
320 EAST 1500 SOUTH	8" Line (N,S&E) S-355'	South line needs lining (broken pipe &roots)	6.50	$26,330
500 SOUTH 850 EAST	8" Line 370'	Showing severe aggregation. "Liner"	6.67	$27,020
1600 SOUTH 100 EAST	8" Line 392'	Line has breaks and tree roots. "Liner"	6.92	$28,032
1564 SOUTH 300 WEST DROP MANHOLE	8" Line 600'	Line showing wear, has grease in it.	6.96	$37,600
980 NORTH 188 EAST	6" Lines W-205'/E-100'	Lines in poor condition, holes and breaks "Liner"	7.11	$28,810
1600 SOUTH 280 EAST	8' Line 635'	Line is thinning, severe aggregation "Liner"	7.26	$39,210
165 SOUTH 705 WEST	8" Line 666'	Line has numerous cracks. "Liner"	7.53	$40,636
390 NORTH 400 WEST	6" Line 136'	6" Line and very low flow. "Liner"	8.04	$21,712
1600 SOUTH MAIN	15" Line 656'	Has severe roots, breaks and agg."Liner"	8.65	$46,736
450 NORTH 900 WEST	6" line 283'	Beverly West sub. Project. Lines to be replaced.	8.75	$70,845
400 NORTH 550 EAST	6" Line North / 8" Line South	N. Line pipe missing. S. Line breaks "Liner" both.	8.81	$47,556
400 EAST CENTER	8" Line 378'	15' line coming in from north restricts 8" line from east	8.89	$16,000
400 NORTH 1000 EAST	8" line 297'	Line showing mod. Agg. & bellies "replace"	9.56	$77,419
900 NORTH 100 WEST	8" Line	First 156' Bellies "Replace" Next 181' Agg. "Line"	9.95	$53,738
300 SOUTH - 650 EAST	8" line (E&W) 80' (W)	W. line bellies & aggregation "Replace"	10.43	$28,160
800 NORTH 297 EAST	6" Line 124'	Line from m/h 11-0238 to 11-0205 severe agg. "Liner"	11.27	$15,208
2000 SOUTH 250 EAST	8" Line 103'	Protruding lat./broken pipe/low flow. Work order.	11.85	$16,000
400 NORTH 850 EAST	8" Line 140'	Line has several breaks, unsure of overall cond. of line.	12.18	$16,440
753 SOUTH 1080 EAST	8" Line 170'	Line in fair cond. Few off-set joint and infil. @ Lateral.	13.20	$17,820
1600 SOUTH 235 WEST	8" line 121'	Line has bad bellie "Replace"	13.88	$37,467
480 NORTH 800 WEST	6' Line 400'	6" Easement line. Roots ! It's being treated.	14.89	$26,800
1600 SOUTH 311 EAST	8" Line 237'	Line has small bellies and off-set joints. (Easement)	15.48	$20,902
1400 SOUTH 200 EAST	8" Line 242'	Line showing aggregation "Liner"	15.65	$21,132
1550 NORTH 650 WEST	8" Line 246'	Line in fair cond. Has bellie over 200' "Replace"	16.26	$65,842
1200 NORTH 1000 EAST	8" Line 250'	Line has bad bellies, slow flow. "Replace"	16.48	$66,750
400 NORTH 760 WEST	8" Line 430'	Roots ! It's being treated.	16.54	$29,780
570 NORTH 450 EAST	8" Line 257'	Line has low flow, laid flat. "Replace"	16.87	$68,339
1400 NORTH 950 WEST	8" Line 259'	Line has multiple bellies. "Replace"	16.99	$68,793
800 SOUTH 600 WEST	8" Line 285'	Line in good cond. Needs point repair (work order).	17.12	$23,110
885 NORTH 75 EAST (memo)	6" Lines N-427' E-365'	Line to the north is Lined. Line east needs "Liner"	17.50	$94,475
1880 NORTH 90 WEST	8' Line 270'	Line has lots of bellies "Replace"	17.60	$71,290
875 NORTH 550 EAST	Flush manhole	Lateral comes into m/h, flush as needed.	17.78	$16,000
1600 SOUTH 800 EAST	8" Line 281'	Line has bellies & aggregation "Replace"	18.22	$73,787
1600 SOUTH 200 EAST	8"Line 322'	Line is showing aggregation. "Liner"	18.38	$24,812
850 SOUTH 150 WEST	8" Line 204'	Several small bellies and showing aggregation.	18.80	$25,384
1700 SOUTH 270 WEST	8" Line 267'	Line laid flat w/bellies. "Replace"	18.92	$76,609
947 NORTH 75 EAST	6" Line 315'	Line is in good shape but has multi. breaks, "Liner"	19.19	$77,725
400 NORTH 400 WEST	8" Line 548'	Roots ! It's being treated.	19.56	$35,208
450 NORTH 450 EAST	8" Line 313'	Line has bellies and off-sets "Replace"	20.01	$81,051
500 NORTH 450 WEST	8" Lines N-242' / S-140'	Line North good cond. Line South small bellie & low flow	20.13	$108,714
800 NORTH 1370 WEST	8"Line 319'	Line has bellies and aggregation "Replace"	20.35	$82,413
600 NORTH MONTERY DR.	8" 323'	Line has bellies and cracks "Replace"	20.57	$83,321
400 NORTH 450 EAST	8" Line 325'	Line has bellies and off-sets "Replace"	20.69	$83,775
400 NORTH 160 WEST	12" Line 322'	Line showing severe aggrigation. "Liner"	20.76	$28,032
810 NORTH STATE STREET	6" Lines N-490'/E-89'	N. line, laid flat with bellies "Replace" E. line "Liner"	22.05	$119,088
300 NORTH 200 EAST	8" Line 195'	Line has bellies & breaks "Replace"	22.32	$60,265
526 NORTH 980 WEST	8" Line 357'	Line has bellies and off-sets "Replace"	22.48	$91,039
100 SOUTH 400 WEST	8" Line 364'	Bellies and aggregation "Replace"	22.87	$92,628
1800 NORTH 760 WEST	8" Line 488'	Line has bellies and laid flat "Replace"	23.48	$126,776
1011 SOUTH 150 WEST	8" Line 517'	Severe bellies and aggregation "Replace"	23.59	$127,359
1224 NORTH 710 WEST (crest)	8" Line 382'	Line has 4 severe bellies. "Replace"	23.88	$96,714
1800 SOUTH 250 EAST	8" Line E-214' W-289'	Both lines showing aggregation "Liner"	24.55	$33,138
430 NORTH 800 WEST	6" Line E-415' /8" line N-257'	Line N. bellies and breaks "replace"/ Line E. ?	24.97	$168,544
840 NORTH 75 EAST	6" Lines E-250' N-324'	Line the North, needs "Liner"	25.82	$139,410
400 SOUTH 800 WEST	10" Line 545'	Bellies, 400 S. trunk line slows 800 W. line	26.07	$140,800
1650 SOUTH 740 EAST	8" Line 112'	Line has tree roots. Work order.	26.24	$35,424
1800 SOUTH MAIN	8" Line 339'	Line is showing aggregation "Liner"	28.44	$25,594
800 NORTH 200 EAST	6" Line 617'	Line has bellies & aggregation. "Replace w/8" line.	29.75	$160,655
888 NORTH 275 EAST	6" Lines E-266'/N-16'	East line off-set joints "Replace" South line low flow.	42.57	$76,630
245 SOUTH 1000 EAST	10" Line 203'	Line has bad bellies & roots "Replace"	43.50	$58,720
150 NORTH 1150 WEST	8" Line 232'	Line has several bad bellies. "Replace"	46.42	$62,664
1151 WEST 600 SOUTH	8" Line 339'	Line is in fair cond. A few open joints and laid crooked	55.83	$75,376
1030 NORTH 910 EAST	8" Line 297'	The first 266' lined. The remainder needs to be "replaced"	57.35	$77,419
1000 NORTH 250 EAST	8" Lines N-329'/E-324'	North line good cond. East line severe belly "Replace"	61.89	$83,548
1700 SOUTH STATE/EAST	10 " Line 309'	Line has numerous bellies. "Replace"	62.34	$84,160
1600 SOUTH 740 EAST	8" Line 340'	Line has small bellies, good cond.	64.58	$87,180
850 SOUTH 400 EAST 6" LINE USE TIP ONLY	6" Line 382'	Line has several long bellies. "Replace"	68.24	$92,130
600 NORTH 120 EAST	6" Line 550'	Line has bellies and off-set joints. "Replace" w/8"	77.92	$140,250
500 NORTH 1020 WEST	6" Line 681'	This line has been lined. No further action required.	82.23	$185,017
200 SOUTH STATE / east side	8"/6" Line 413'	Line has crack, aggregation. "Replace"	83.87	$150,967
660 NORTH 600 EAST	8"Lines N-287'/E-289'	E- line good (point repair). N- line agg. & bellies "Replace"	84.86	$152,752
400 NORTH 500 EAST	8" Lines N-323'/S-300'	North line bellies & roots "Replace" South line ok.	87.46	$157,421
400 NORTH 720 WEST	6" Line 1,427'	This line has been lined. No further action required.	91.22	$164,200
1838 SOUTH250 EAST	8" Lines 198' / 155'	Lines good. Lateral in mh's is the problem.	106.81	$96,131
800 SOUTH 200 WEST	8" Line 395'	Line in good cond. Small belly	110.74	$99,665
			Total	**$5,995,657**

APPENDIX D
TECH MEMO:
MAINTENANCE AND MANPOWER

Bowen Collins
& Associates, Inc.
CONSULTING ENGINEERS

TECHNICAL MEMORANDUM

DATE: June 24, 2015

TO: Neal Winterton
Water Resources Division Manager
Orem City Municipal Corp
1450 W 550 N
Orem, Utah 84057

FROM: Keith Larson, P.E.
Bowen, Collins & Associates
154 East 14000 South
Draper, Utah 84020

PROJECT: Orem City Master Plan

SUBJECT: Evaluate Maintenance and Manpower

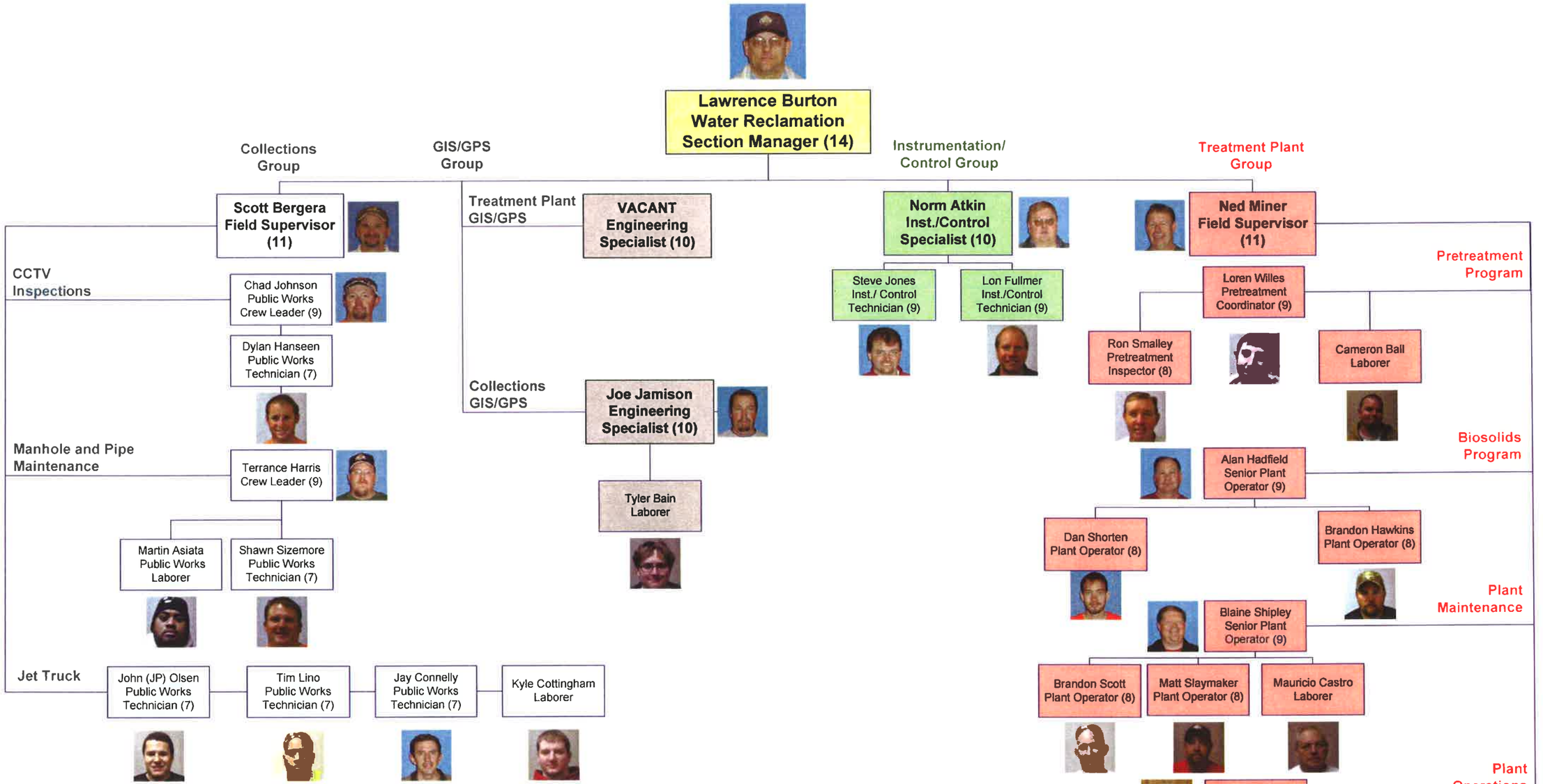
INTRODUCTION

As part of the sanitary sewer master plan, Orem requested that Bowen, Collins and Associates analyze and evaluate the existing maintenance programs and work force needs for Orem City and recommend changes to improve maintenance and how manpower is utilized. BC&A used both subjective interviews with personnel and objective collection of data to analyze and evaluate these aspects of the City's sanitary sewer program. The purpose of this memorandum is to summarize the findings of this evaluation and provide recommendations to eliminate any deficiencies.

EXISTING OREM CITY WATER RECLAMATION SECTION OPERATION AND MAINTENANCE

An organizational chart of the existing personnel in the Orem City Water Reclamation Section is attached. As can be seen in the chart, the section is organized into four groups:

- **Collections –** The collections group operates, maintains, and inspects the City's sewer collection pipelines and manholes. Major tasks include CCTV inspection of sewer pipelines, routine cleaning of sewer pipelines, and repair of damaged pipes and manholes.
- **Treatment –** The treatment group operates and maintains the City's existing water



Water Reclamation Section
Water Resources Division

Updated February 2015

reclamation facility and lift stations located throughout the City. In addition to the daily operation and maintenance of these facilities, this group includes personnel responsible for pretreatment (regulation of discharge for industries within the City) and biosolids management (disposal of treated solids at the end of the treatment process).

- **Instrumentation/Controls –** The instrumentation and controls group is responsible for all electrical instrumentation that meters, monitors, or controls components of the waste water conveyance and treatment process.
- **GIS/GPS –** The GIS and GPS group is responsible for all the gathering, storage, and analysis of data associated with wastewater infrastructure. This includes detailed mapping and modeling of the collection system, and asset management at the water reclamation facility.

Each group is discussed in detail in the following sections. Information regarding the duties and performance of each group has been assembled from interviews with City staff, documents provided by the City, and the City's website.

COLLECTIONS GROUP

The collections group operates, maintains, and inspects the City's sewer collection pipelines and manholes. The group is currently organized into three subgroups: inspection, cleaning, and repair.

Pipeline Inspection

The City's pipeline inspection crew currently has three primary areas of responsibility:

1. **Acceptance of new pipeline installations** – The inspection crew is responsible for inspecting and mapping out all new sewer line installations in the city before they are accepted by the city and the bond is released to the contractor.
2. **Assessing existing pipeline conditions** – When the inspection crew is not inspecting new lines, it is kept busy televising older lines in the system to determine the integrity of the existing lines. The crew identifies problems within the infrastructure and makes recommendations to remedy the problem. This information is updated in the collections data base.
3. **Assisting residents with lateral inspections** – Another service the inspection crew provides for the residents of Orem is inspection of lateral. The inspection truck includes a small camera on a push cable that can inspect homeowners' sewer laterals. While laterals are not the responsibility of the City, this service helps residents identify problems and offer solutions from an unbiased party.

The inspection crew televises approximately 35 to 40 miles of pipe each year to check pipe condition and quality of installation of new pipe. The complete system contains a total of 287 miles of sewer lines. This equates to full inspection of the system once every 7 to 8 years.

Based on the information gathered in association with this evaluation, BC&A would recommend

two actions in association with the existing pipeline inspection activities:

- **Adopt PACP –** It is recommended that the City consider adoption of the Pipeline Assessment and Certification Program (PACP) for all future pipeline condition assessment. PACP is nation standard for pipeline assessment that has two significant benefits. First, it establishes a standard defect severity grading process that allows classification of pipe condition that is consistent, regardless of who is doing the inspection. Second, it allows for the storage of inspection data in a searchable electronic database. These two features facilitate grading of pipelines as part of future asset management decisions. A more comprehensive discussion of PACP is contained in Issue Paper 1 attached to this memorandum.

- **Optimize inspection schedule –**The current practice of the inspection crew is to inspect each pipe on a routine basis (approximately once every 7.5 years). While this is probably adequate for most pipelines, it may not be frequent enough for some of the City's more critical lines, or in areas where corrosion potential is high. For the purposes of prioritizing inspection activities (and resulting maintenance and repair activities), it is recommended that the City establish a process for defining facility criticality. Issue Paper 2 attached to this memorandum discusses criticality in detail. Once criticality is established, it is also recommended that the City develop an improved method for organizing and tracking inspection activities.

Pipeline Cleaning

Orem City's cleaning crew operates multiple jet/vacuum trucks to clean the City sewer lines. The cleaning crew also has specialized equipment for killing and removing tree roots and eliminating grease buildup that occurs in certain areas of the sewer system. Cleaning activities generally fall into one of two categories:

1. **Routine Problem Area Cleaning** – The collection crew has a routine cleaning schedule for pipelines that must be serviced on a weekly, monthly, bi-monthly, quarterly and bi-annual basis to assure good reliable sewer service. Pipelines that fall into this category include areas of the system that have problems with bad hydraulics (resulting in sediment deposition), grease accumulation, tree roots, etc.
2. **General System Cleaning** – Even pipelines that do not have reoccurring problems can benefit from periodic cleaning. As a result, the City has a very proactive cleaning program, with a goal to clean the entire collection system every 3-4 years. The purpose of this program is to grit and debris in the collection system on a regular basis rather than have it build up and cause problems in the collection system or at the treatment plant.

In addition to regular cleaning activities, the pipeline cleaning crew is available 24 hours a day, 7 days a week to respond to sewer emergencies, backups etc. The goal for all responses is to be at the site within 30 minutes of when the call was first received.

Based on the information gathered in association with this evaluation, BC&A would recommend two actions in association with the existing pipeline cleaning activities:

- **Eliminate routine cleaning areas where possible –** As part of the master plan, a detailed analysis of existing routine cleaning areas was completed. From that analysis, several projects were identified to eliminate a number of the routine cleaning areas. Many of the projects are low cost and will be more than offset by reduced maintenance costs within a few years. It is recommended that the City begin to complete those projects, starting with the projects with the quickest payback period. While not all of the routine cleaning areas can be eliminated, a large number can. The amount of maintenance time that can be eliminated through these projects is estimated in Table 1.

Table 1
Routine Cleaning - Annual Hours That Can be Eliminated Through Projects

Frequency of Maintenance	Current Annual Man Hours	Annual Man Hours that can be Eliminated	Man Hours that will Remain
Weekly	182	182	0
Bi-monthly	462	414	48
Monthly	1770	1200	570
Quarterly	366	258	108
Bi-yearly	26	12	14
Total	**2806**	**2066**	**740**

- **Optimize cleaning schedule –**The current practice of the cleaning crew is to provide cleaning for each pipe on a routine basis (approximately once every 3.5 years), regardless of need. Because excessive cleaning can shorten pipe life and consume valuable City resources, BC&A would recommend moving to a cleaning schedule based on need only. To do this, the City will need to develop a method of tracking the results of each cleaning activity in its work order or GIS system. Possible secondary data fields that could be added to accomplish this task include:

Secondary Data Category	Possible Data Entries
Reason for Clean	Routine Cleaning
	Complaint Call or Observed Problem
	Other
Results - Sediment	Little to none
	Less than 5 percent pipe depth
	5-10 percent pipe depth
	10-25 percent pipe depth
	Greater than 25 percent pipe depth
Sediment Type	Fine sediment and sludge only
	Coarse sands and gravels
	Rocks, chunks of concrete, or other large debris
Results - Grease	Little to none observed
	Minor
	Significant
Results - Roots	Little to none observed
	Minor
	Significant
Results – Other Debris	Little to none observed
	Significant other debris observed
Field Assessment	Cleaning not needed – Significant increase in cleaning interval recommended
	Cleaning produced modest results – Small increase in cleaning interval recommended
	Cleaning productive – No change in cleaning interval recommended
	Cleaning overdue – Decrease in cleaning interval recommended

Once the required data collection process is in place, the following actions are recommended:

a. *Continue with Regular Cleaning Schedule for a Period of 3.5 Years.* Because no data is currently available on other pipelines in the system, it is recommended that the City follow its regular, systematic cleaning schedule for a period of 3.5 years, or as long as it takes to clean all the pipe in the system at least once. This will allow the City to develop a baseline of cleaning data.

b. *Develop Future Cleaning Schedule.* After baseline data has been collected, it is recommended that the City review the results and develop a new cleaning schedule

based on need. The goal will be to clean each pipe only when it is needed, instead of simply on a routine basis. For some pipelines this will require more frequent cleaning than is currently occurring, for others, less frequent cleaning will be recommended. Over the years, this cleaning schedule should be revised and improved as additional cleaning data is collected in the system.

Manhole and Pipe Repair

The City's repair crew works to repair and maintain the manholes and sewer pipes throughout the City. The repair crew performs their own sewer line spot repairs, both open trench and trenchless, and repairs damaged hardware, risers and manhole lids. The crew is fully equipped with the equipment and materials necessary to make routine repairs but does not have the manpower or equipment to perform some larger replacement projects.

Staffing for repair crews is often difficult to evaluate because the need for staffing is entirely dependent on how much work an entity wants to do itself versus how much will be contracted to outside providers. With increased staffing levels, the repair crew would certainly be able to do more work in-house and take on larger projects. However, the existing crew appears to be adequate to address the immediate repair needs of the City.

Collections Group Staffing Levels

Trying to compare staffing levels between different sewer providers is complicated because each provider structures its organization a little differently than the next. Providers also tend to have different philosophies regarding how much work to do with its own crews versus how much work to contract to outside providers. This makes direct comparisons between staff levels and positions difficult.

As one method of comparing general staff levels, BC&A completed a comparative analysis of the number of personnel and salary level of the department. Several public agencies along the Wasatch front were used in the comparison. Specific names of the agencies are not included because only rough data was collected. However, this data will allow for some comparison of the staffing level and compensation of the City with other agencies on a general basis. The figures below contain the results of the comparative analysis. Figure 1 looks at raw number of employees (seasonal or temporary employees are not included), Figure 2 looks at average compensation per employee, and Figure 3 looks at total department compensation. Circles represent entities with collections and treatment departments. Squares represent entities with collection systems that are not required to also maintain wastewater treatment facilities.

Figure 1
Total Collection System Employees

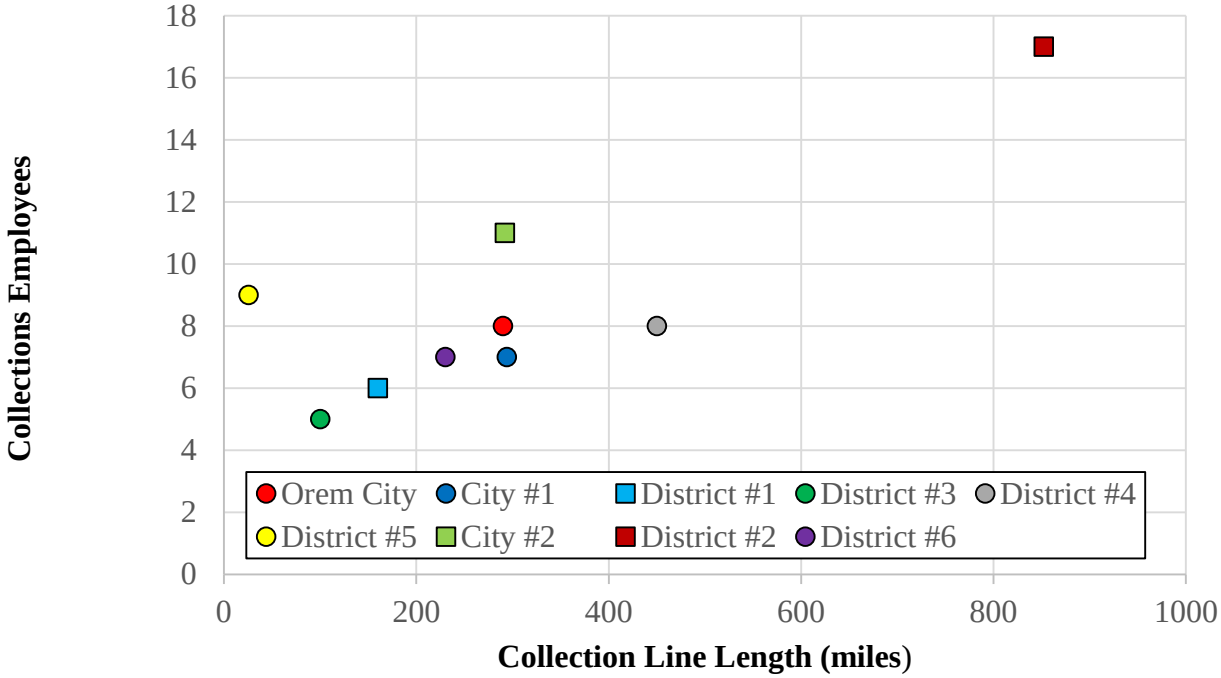


Figure 2
Collections Systems Average Compensation Comparison

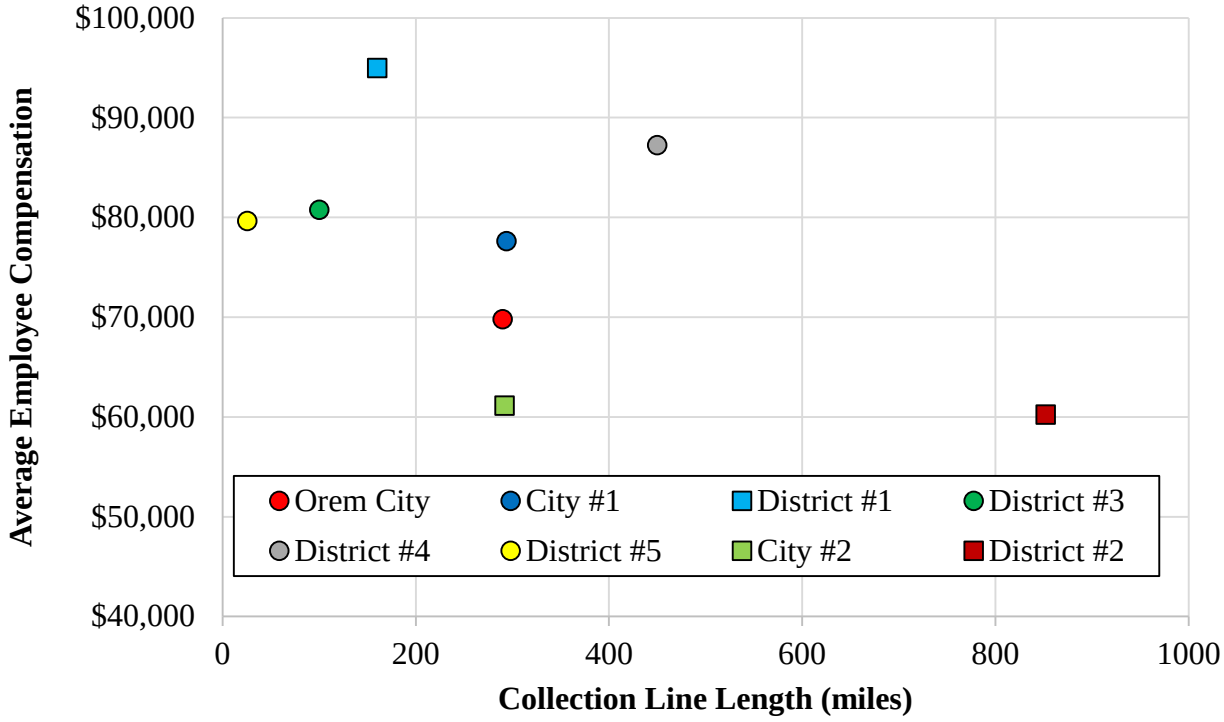
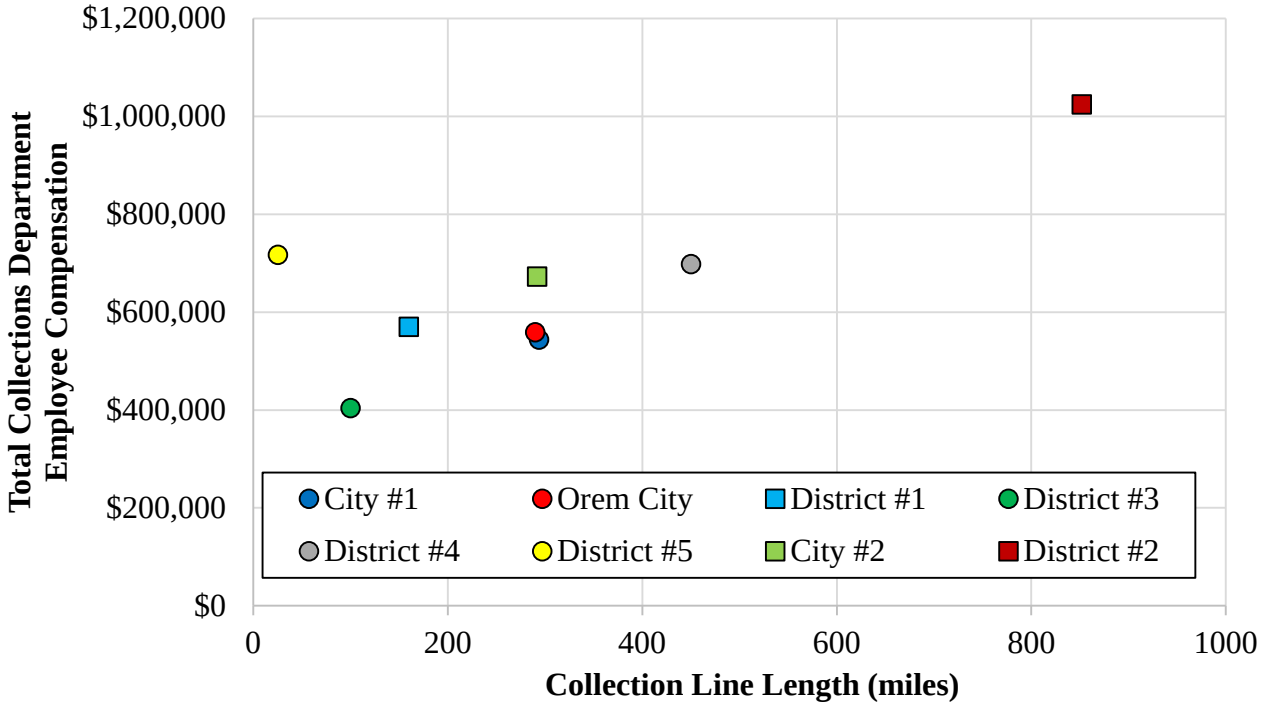


Figure 3
Collections Systems Total Compensation Comparison



A few different observations can be made based on the figures:

- The number of Orem City collection system employees appears to be right in line with the size of its system.
- For the entities surveyed, compensation for Orem City collection system employees appears to be near average. It has the lowest average compensation for an entity operating a wastewater treatment facility, but slightly higher compensation than some entities without a treatment plant.
- Total compensation in Orem City also appears to be approximately in line based on the size of its system. There are some providers with comparably higher compensation, but several other providers with compensation very similar to the City.

Based on all the information available, the collections department appears to be staffed similar to comparable departments along the Wasatch Front. The system appears to be well maintained and no significant shortfalls in staffing were identified. Compensation for collection employees may be slightly below average, but not significantly so.

➢ ***Bottom Line Staffing Recommendation (Collections) – No change***

No changes in the staffing of the collections group are recommended at the current

time. While the percentage of time spent on individual tasks may change per the recommendations contained in this memorandum, the overall level of effort projected for the collections group is consistent with current staffing levels. However, this will change as population and additional collection pipelines are added to the system and the City should continue to look at this issue in future master plans.

TREATMENT GROUP

The treatment group operates and maintains the City's water reclamation facility and lift stations. The group is currently organized into four subgroups: operations, maintenance, pretreatment, and biosolids.

Plant Operations

The operations group covers the water reclamation facility (WRF) and also the wastewater lift stations. Plant operations personnel monitor WRF function and make operational adjustments to account for varying influent conditions. The WRF utilizes an Activated Sludge Biological Nutrient Removal (BNR) treatment process. The BNR process is an extended aeration system that reduces biological loading in the water. The treated water is then disinfected using chlorine prior to discharge. Solids are separated from the wastewater and further processes via a thermophilic anaerobic digestion system. This system is used to further reduce the volume of biosolids produced in the plant and eliminate pathogens. The total treatment process allows water to be separated from the waste as a clean reusable resource and released to environment via Powell Slough and on into Utah Lake.

In recent years, the WRF has undergone several changes, most notably, the addition of the BNR system. This has created some additional responsibilities for operations staff. However, consistent with national trends, the department has leveraged improved technology to maintain staffing levels while absorbing the additional responsibilities. City personnel report that current staff levels have been able to meet the recent addition of new responsibilities for the time being. As the system continues to expand or as new plant functions are added (such as increased treatment for reuse purposes), additional staff will likely be required.

Plant Maintenance

The maintenance group handles all of the work order ticket items for the WRF and 7 system lift stations. This includes 10 motor control centers, 160 pumps throughout the Plant, and many other significant mechanical and electrical components. In total, the plant maintenance crew performs over 4500 preventive maintenance work orders per year. Tasks include the repair, rebuild, and manufacture many custom pieces of equipment for specific applications all around the plant.

Staffing needs in the plant maintenance group will be a function of both the quantity and condition of plant infrastructure. From BC&A's investigations, it appears that some of the equipment

requiring the most maintenance effort is not the oldest equipment but some of the more recent additions to the facility. It appears that some cost driven design decisions during recent plant upgrades may have resulted in long term operational considerations that will result in additional ongoing maintenance.

One example of this is the PVC pipe headers in the aeration piping for the oxidation ditches. Although the equipment has only been in service for a few years, it has already experienced several problems. Based on information taken from interviews, the hot air from the blowers has caused segments of the pipe to become brittle and crack. The resulting air leaks are difficult to deal with and require the operators to reroute plant flow. Significant adjustments like this in plant operation make it a challenge to stay within permit limits. The upgrades have also required additional time from operations personnel as they learn the nuances of the system and how it integrates with the older plant features.

The condition of the lift stations and plant facilities is tracked with a task order system. The task order system helps the personnel keep track of periodic maintenance activities that are needed to keep the facilities in good working condition. The task order system takes the place of manual forms that are used by many municipalities to keep maintenance tracking simple but up to date. The task order system also enables efficient reporting of the status of plant facilities.

Overall, the maintenance group appears to run efficiently but occasionally gets overbooked trying to cover all the recommended maintenance items for the pumps and equipment throughout the plant. As the treatment plant has expanded capacity, there have been no corresponding increases in personnel to accommodate expansion. As a result, the City has had to postpone some maintenance tasks. Proactive inventory management has also been limited, resulting in more expensive reactive inventory management. In addition to these existing issues, the City will be implementing a reclaimed water reuse system in the near future to reduce demands on the culinary water system. The added complexity of treating water to meet secondary water requirements will increase the burden on existing staff. Based on these needs, City personnel have requested increasing staff in the plant maintenance group to better satisfy the needs of continued maintenance with increasing capacity and complexity for the facility.

Pretreatment

The pretreatment group regulates wastewater discharged from the industries within the city. It regulates the types and amounts of pollutants that each industry is allowed to release into the sewer system. By doing this, the pretreatment group protects the treatment plant from excessive amounts of pollutants that can overload its designed treatment capabilities. Activities of the pretreatment group also ensures that no harmful pollutants are discharged that might damage either the collection system, the biological processes of the treatment plant, or the environment. The City pretreatment group currently employs one coordinator, one inspector and on part-time worker.

Efforts of the pretreatment group appear to be successful and operations are running smoothly. Overall, staffing of the pretreatment group appears to be adequate with the possible exception of

increased GIS support which will be discussed subsequently.

Biosolids Management

Each year, the biosolids management group dewaters and arranges for the disposal of approximately 12,500 tons of sludge that are left over after the treatment process. The biosolids are treated to a quality standard set by the Utah State Division of Environmental Quality and one hundred percent of this material is land applied to agricultural areas for fertilizer. It is a high quality soil amendment rich in nutrient value. The current staffing level of the biosolids group appears to be adequate to meet system needs for the foreseeable future.

Treatment Group Staffing Levels

Similar to what was done with the Collections group, BC&A completed a comparative analysis of the number of personnel and salary level of the department. The figures below contain the results of the comparative analysis. Figure 4 looks at raw number of employees (seasonal or temporary employees are not included), Figure 5 looks at average compensation per employee, and Figure 6 looks at total department compensation.

Figure 4
Total Treatment Employees

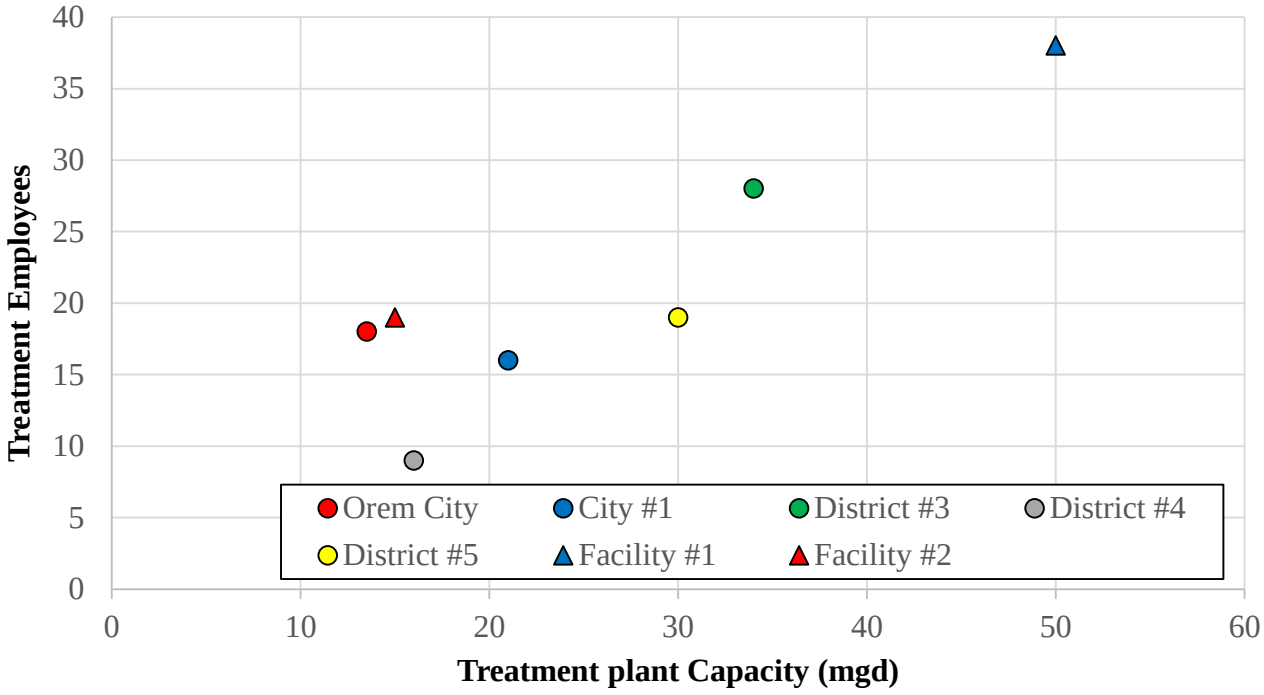


Figure 5
Treatment Entity Average Compensation Comparison

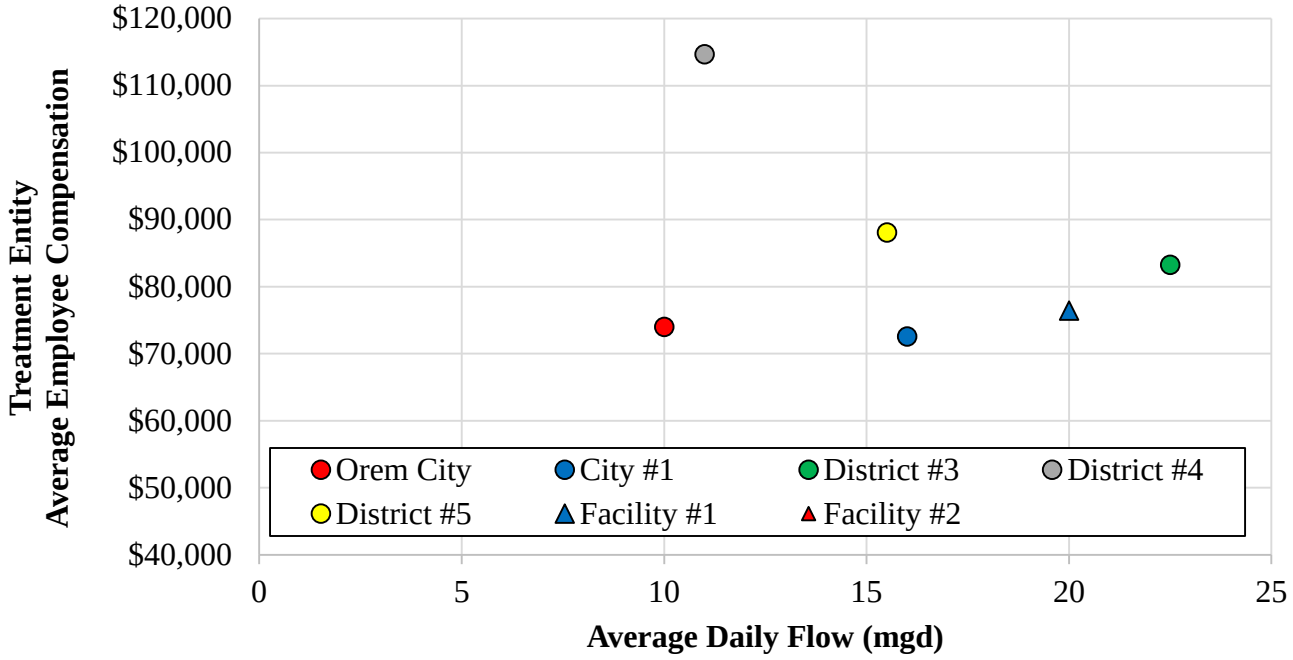
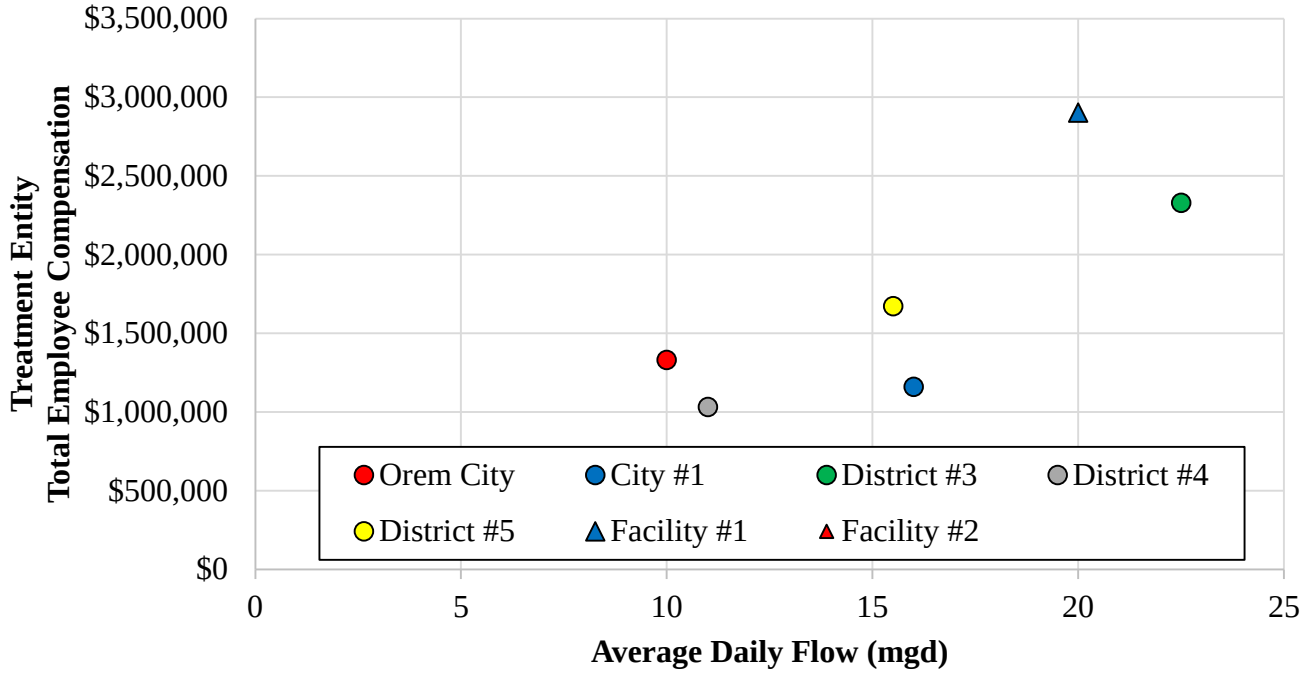


Figure 6
Treatment Entity Total Compensation Comparison



A few different observations can be made based on the figures:

- The number of Orem City treatment system employees appears to be a little higher than average for the size of its system. With this said, treatment plant staffing levels can be difficult to compare because of the different processes and functions that occur at each plant. While plant capacity is indicated in Figure 4 as a reference, this does not account for the relative complexity of operating treatment plant facilities. Issues such as the type of process being used, the age and condition of the plant facilities, whether or not the plant has reuse, number of lift stations, how pretreatment activities are conducted, etc. will all affect how many employees are need to staff a treatment group.
- For the entities surveyed, compensation for Orem City treatment system employees appears to be near average or slightly below average.
- Total compensation in Orem City appears to be approximately in line based on the size of its system.

Based on all the information available, the treatment department appears to be reasonably staffed when compared to similar departments along the Wasatch Front. Staffing levels are slightly higher than other entities of comparable size, but this is likely explained by the significant number of lift stations in the City and relative complexity of the City's treatment process. Compensation for treatment employees may be slightly below average, but not significantly so. The system appears to be well maintained.

With this said, current staffing levels may not be adequate to meet future needs. Of specific concern is the maintenance group. While the maintenance group appears to be run efficiently, it does occasionally gets overbooked trying to cover all the recommended maintenance items for pumps and equipment throughout the plant. Additionally, a major new responsibility is planned to be added in the near future as additional treatment facilities are added to produce reuse water for secondary irrigation.

- ***Bottom Line Staffing Recommendation (Treatment) – 1 Additional Full Time Equivalent (Maintenance Group)***

  It is recommended that the City hold staffing at current levels until the completion of the reuse water system. At that time, it is recommended that the City consider adding one additional full time position to the maintenance group.

  Purpose of proposed new staff: Additional maintenance worker will be responsible for added maintenance load of new reuse treatment system and will increase efforts in maintaining additional equipment added as part of recent treatment plant improvements (65 percent of time). The new position will also help develop and execute an inventory management plan (35 percent of time).

  Consequence of not increasing staff: Because the recommended position is a maintenance position, it may be possible to postpone this additional hire and still

have an operational system for a period of time. However, without additional help, the addition of new duties associated with reuse will result in less time for regularly schedule maintenance activities in the system. This means that many of the important, but not urgent preventative maintenance activities that normally get completed will need to be postponed or skipped for lack of resources. Over time, this will result in premature equipment failure and increased equipment replacement costs.

A second consequence of not filling this position is that inventory management will continue to be based primarily on reactive responses instead of proactive action. While quantifying the costs of this consequence is beyond the scope of this memorandum, it is clear that this will result in higher costs for parts and materials, along with inconvenience and cost associated with inventory delivery delays.

INSTRUMENTATION AND CONTROLS GROUP

Throughout the Orem City collection and treatment system, there is electronic equipment that regulates flow, monitors treatment conditions and stages, turns selected pumps and equipment on and off at predetermined intervals, and sends vital control information to a centralized computer system. This information is then manipulated with control software to allow precise control and information to the operators so that the system can be operated at its peak efficiency. The responsibility for the installation, maintenance, and programming of this equipment falls to the instrumentation and controls group.

The current staffing level of the instrumentation and controls group appears to be adequate to meet existing system needs. However, with technological advances, instrumentation and control has become significantly more sophisticated in recent years. This trend is only expected to accelerate. Because needs can change rapidly in this field, it is recommended that Orem City closely monitor staffing needs in this group over the next several years.

- ***Bottom Line Staffing Recommendation (Instrumentation) – No change***

  No changes in the staffing of the instrumentation group are recommended at the current time, but needs in this group should be monitored closely over the next several years.

GEOGRAPHIC INFORMATION SYSTEM (GIS) GROUP

The Geographic Information System (GIS) and Global Positioning System (GPS) group helps to monitor and map the wastewater treatment and collection system. This is done through the creation and maintenance of a map based database that includes cleaning and work histories, trouble spots, and improvement needs. The database enables staff to keep track of all maintenance and forecast potential upgrades that may be required within the treatment system. This forms the backbone of the City's asset management program.

While this group is currently the smallest group in the department, the activities of the GIS group are essential to the function of the other groups. For the collections crew, the GIS database includes manhole and pipeline data with the physical location, depth, size, material, and condition of each facility. For the treatment crew, similar information is collected and organized relative to treatment plant facilities including pumps and other major pieces of equipment. This information is available to City crews at all times via laptop computers that are equipped in all the maintenance vehicles. The information provided by the GIS group assists City personnel, public, contractors, and independent engineers in designing, repairing, and maintaining the facilities.

According to the City's organization chart, Orem city has a position for a GIS/GPS specialist that has been vacant for some time. Historically, the collections database was maintained by one specialist with the pretreatment and treatment database maintained by a second. As a result, the City has fallen significantly behind on some GIS activities. The City has recently hired an intern to perform some of the basic duties of the missing position, but the intern does not have the skills to fill the full responsibilities of the position.

- ***Bottom Line Staffing Recommendation (GIS) – 1 Additional Full Time Equivalent***

  It is recommended that the City fill the existing vacant GIS position as soon as possible.

  Purpose of proposed new staff: The additional GIS employee will resume the duties associated with the vacant position. This will include focusing on the treatment plant and the pretreatment program which will allow the existing GIS employee to spend more time on his primary focus of the collection system.

  Consequence of not increasing staff: The City has a number of systems where data is stored including: GIS, SCADA, and task order tracking systems. Some of the data storage and use functions that are necessary to operate the facilities could be improved and many agencies have found it to be cost effective to consolidate systems. Annual costs of using multiple software systems to organize and track data can be burdensome. There are a number of possible options the City could evaluate to improve current data storage and operation functions. However, it will not be possible to consolidate and improve systems until a new GIS specialist can be employed to evaluate data collection and storage to improve efficiency.

  Improving GIS performance should be a priority because it helps to organize the time spent by other crews. Activities such as prioritizing inspection, cleaning, and maintenance activities have the potential to save the City thousands of man hours each year. These activities cannot be accomplished without effective data collection and management through GIS. Increasing the staffing in the GIS department is recommended because effectively collecting, maintaining and utilizing data can provide long term cost savings for the City.

CONCLUSIONS AND RECOMMENDATIONS

A number of conclusions and recommendations can be made from the analysis presented in the previous sections:

1. **Fill existing vacancy in the GIS Group –** The City should fill the vacant GIS specialist position as soon as possible. Because GIS is critical to the work flow of all the other groups, the cost of adding a GIS specialist will be largely offset through improved data management, eliminating redundant software systems, and improving work flow.

2. **With the completion of the reuse project, create one new position in the Treatment Group** – Of the entities surveyed for this evaluation, none operate a treatment system to reuse reclaimed water for secondary irrigation. In addition, while the treatment plant capacity has increased in capacity and complexity over the last decade, there have been no corresponding increases in treatment plant personnel. Existing personnel have been able to keep up with most asset management requirements, but increased responsibility may pose risks to exceeding the City's discharge permit if additional personnel are not added to manage facilities. With the completion of the reuse project, it is recommended that the City consider adding one new position to assist with maintenance of the water reclamation facility.

3. **Continue to monitor staffing needs of other groups** – No other increases in staffing have been identified at this time. However, with the addition of the Southwest Annexation area, further development in Vineyard, and overall system growth, the City will want to continue to monitor the effectiveness of existing crews to meet the needs of the system.

4. **Consider changes in work process** – BC&A has provided some recommendations for improvements in the work flow process relative to asset management and maintenance priorities (as summarized previously in this memorandum). Once the existing GIS vacancy is filled, it is recommended that the GIS group look at ways of incorporating these recommendations into the work process to reduce maintenance costs and improve system performance.

5. **Keep an eye on compensation** – The success of a system is is largely determined by its personnel. Since compensation is an important factor to attract and retain personnel to meet the City's long term staffing needs, it is important the that City's compensation package be competetive with neighboring communities. The limited analysis conducted here indicates that Orem City's compensation is about average, but more detailed analysis regarding level of experience and training for each employee to make firm conclusions. It is recommended that the City conitnue to monitor compensation to make sure it is competetively attracting and retaining qualified personnel.

ISSUE PAPER

Issue No: 1

Project: Orem Sewer Master Plan

Date: 19 June 2015

Subject: Pipeline Condition Assessment Data

Attn: Engineering, GIS, O&M, Management

DESCRIPTION OF ISSUE:

The most fundamental component of an asset management program is the development of a program to accurately assess the condition of existing assets. BC&A has reviewed the City's existing condition assessment program for pipelines. Based on this review, we have concluded the City's existing condition assessment program currently produces only limited data that can be used in a meaningful way for asset management. As a result, BC&A would recommend a change of direction in the way pipeline condition assessment data is collected and stored by the City.

ACTION ITEMS:

All – Review the recommended change to PACP condition assessment coding. Make the decision of whether or not to adopt this recommendation.

Management – If the recommended change is adopted, commit the resources necessary to make the change.

GIS –Determine how PACP inspection data will be transferred and stored.

All – Establish a goal for collecting condition assessment data for pipelines in the system

ADDITIONAL DISCUSSION:

PACP condition assessment coding

Existing Condition Assessment Process

Based on interviews with Orem City personnel, the City's current condition assessment program consists of the following process:

1. Pipelines are identified for CCTV inspection in one of three ways:

    a. First, a certain number of pipelines are identified for routine inspection each year. The City crews generally start at one end of the system and systematically work

their way through the entire City. Under this system, all pipes are inspected at an equal frequency.

b. Second, a pipeline inspection can be requested by the City's engineering staff to investigate a specific problem or prepare for an improvement project.

c. Third, after rehabilitation projects or new construction, a pipeline is inspected to verify the quality of the work.

2. CCTV inspection includes capture of video images of each pipeline with comments regarding observations typed manually by inspection staff. There is not a standardized format for these comments and they are currently recorded on the video image only.

3. Once the inspection has been completed, it receives a cursory review from O&M staff. If O&M staff deem the pipeline to have sufficient problems to potentially merit an improvement project it is passed on to engineering for further review. If O&M staff do not identify sufficient problems to merit further consideration, the inspection video is archived.

4. Those videos provided to engineering receive a more detailed review by engineering staff. Those pipelines with problems that require attention are selected and prioritized for future rehabilitation or replacement.

There are two significant problems with the City's existing pipe inspection process:

- **The process is not as useful as it could be.** While it does collect good data for pipelines that will be incorporated into improvement projects, all the inspection information for pipelines not identified for improvement projects is essentially lost. This is for two reasons:

  – The existing process produces video images only. Images are the best resource for design, but are difficult to work with when trying to make long-term asset management decisions for the system as a whole. To be useful for asset management, the condition assessment process must produce a searchable database. A database is required so that queries can be quickly generated that provide condition comparisons between the various assets within the system and comparisons of condition over time for individual assets.

  – The existing process is not standardized. To make decisions regarding which pipelines receive the most attention, the condition assessment performed on one pipeline must be consistent with the condition assessment on any other pipeline. Furthermore, to assess the deterioration of an individual pipeline, the condition assessment performed today must be consistent with the assessment completed on the same pipeline ten years ago.

- **The process is not as efficient as it could be.**

- Without an easily searchable history of past condition, all pipelines must be inspected on an equal frequency. If the City could develop a history of past condition, it could better know which pipelines were exhibiting signs of deterioration and which were relatively stable. This would allow the City to better match the frequency of inspection with the condition of each pipeline, resulting in fewer required inspections over time.

- The City's current practice of documenting problems requires significant typing by inspection staff. Past history with other entities indicates that documenting problems using standardized coding software can decrease the required inspection time for each pipeline.

- Because there is not a good system for storing data, retrieving data in the past has been difficult. Inspection staff indicate that they have had to inspect some pipelines multiple times over a short period because results for past inspections could not be found.

Recommended Condition Assessment Process

Based on the problems identified above, BC&A would recommend a change in the condition assessment process used by the City. We would recommend that Orem City consider adoption of the Pipeline Assessment and Certification Program (PACP) for all future pipeline condition assessment. PACP is recommended for the following reasons:

1. PACP is a standardized method of describing and coding defects and observations that is now used by several hundred other cities in the United States and is based on an international coding system that has been in place for several decades

2. A PACP training and certification program for users is already in place and has resulted in the certification of several thousand individuals since 2002.

3. As part of PACP, a standard database exchange format has been developed that provides a means for exporting and importing TV inspection data from various software vendors and greatly reduce the ability of vendors to maintain a proprietary database.

4. A PACP certification process for CCTV software vendors is in place and almost all current CCTV software vendors in the United States are PACP certified. This generally means that the CCTV software must correctly use the PACP codes and must have the capability to import and export data using the PACP database format.

5. PACP has a standard defect severity grading process that allows a general classification of each pipe segment based on the severity and number of defects. This will facilitate grading of pipelines as part of future asset management decisions.

The alternative to adopting PACP is for the City to develop its own standardized pipe inspection process. This does not seem prudent for two reasons. First, the PACP program is already

developed and ready for use. The cost of developing a new system and maintaining the system would likely be comparable or greater than any cost associated with adopting PACP. Second, PACP is a non-proprietary national standard. That means that equipment and service providers throughout the nation are familiar with the system and can work within it. It also means that any PACP data produced by one provider will be in a format that is recognizable and useable by other PACP providers. If the City were to develop its own standard, any outside provider would need to learn the City's system before it could do work in the City.

Required Resources to Adopt PACP

PACP could be adopted by the City relatively easily, but it will require the commitment of some resources on the part of management. These resources mainly fall into two categories:

- **Coding Software:** The City's existing CCTV inspection trucks currently use proprietary software from CUES to do all CCTV coding. To move to PACP, the City would need to purchase new PACP compatible software. The cost of TV inspection software varies considerably based on the number of licenses and features. Costs can range from $12,000 for a basic single seat license without training and support to $75,000 for multiple seat licenses with advanced features such as GIS integration, software training and support. The National Association of Sewer Service Companies (NASSCO) maintains a list of PACP certified software vendors on their website (www.nassco.org). This list is updated periodically. As the City considers the purchase of PACP software, they should check the current status of proposed PACP software vendors on the NASSCO website. The project team has hands-on experience using some of the PACP certified software and can provide additional input of those systems when the City gets closer to a purchasing decision.

- **Training:** The only other requirement to adopt PACP is that CCTV operators be trained to use PACP coding. This training is what ensures that coding of pipeline observations is consistent from inspection to inspection. PACP training consists of a two day classroom session that discusses the background of condition assessment, rules for using the codes, and a test to evaluate the users knowledge of PACP. PACP training is generally separate from the TV inspection software and the cost of PACP Training is approximately $750 per user plus a daily rate for additional training using the codes in the field.

Data Storage

At the end of a PACP inspection, two major sources of data are produced. The first is a video image of the pipe. The second is an inspection database that is populated with observation codes from the inspection. The City's GIS department will need to develop a system to transfer and store both of these sources of data from the CCTV inspection trucks. BC&A has provided the City with a copy of the PACP database for review by the GIS department. It will be important to store all future data in PACP format so that it is compatible with PACP data from all future service providers.

Establish a Goal for Moving to PACP and Collecting Condition Assessment Data for the System

If the City agrees with the conclusions and recommendations contained in this issue paper, it is further recommended that the City establish a time line for implementing PACP condition assessment of the system. In the future, it is recommended that all inspection activities be prioritized by criticality (see Issue Paper #2). Unfortunately, since no condition assessment data currently exists, it is recommended that initial inspection activities be prioritized by consequence of failure (see Issue Paper #2) with the following goals for completion (times refer to time after adoption and implementation of PACP):

Consequence of Failure Level	Goal for PACP Inspection
1	Within one year
2	Within three years
3 (Concrete pipe & known problems)	Within three years
3 (All other pipe)	Within ten years

The consequence of failure levels referenced above refer to the importance of the pipelines and will be discussed in detail in Issue Paper #2. In brief, Level 1 pipelines represent the most important 5 percent of the system. Level 2 pipelines represent the next most important 10 percent of the system. Level 3 represents all remaining pipelines. To meet this schedule, the City would need to inspect approximately 10 percent of its system each year which is well within the capacity of the existing crew.

It will be noted that Level 3 pipelines have been divided into two categories. City personnel have indicated that they would like to place increased priority on the inspection and assessment of Level C pipelines that fall under either one of two categories: concrete pipe (based on observed corrosion problems with other concrete pipes) and pipes that have had known problems in the past. It is recommended that these pipelines be prioritized like Level 2 pipes.

ISSUE PAPER

Issue No: 2

Project: Orem City Sewer Master Plan

Date: 19 June 2015

Subject: Criticality

Attn: Engineering, GIS, Management

DESCRIPTION OF ISSUE:

Criticality is defined as the combined consideration of the consequence of failure and the probability of failure of an asset. The term criticality is often used interchangeably in asset management with the term risk. This is because criticality is used to compare the risk associated with a given asset relative to the rest of the assets in the system. Criticality is the key component used in decision making for asset management. It is the calculation of criticality that prioritizes the attention and resources of the City as they manage the collection system. The purpose of this issue paper is to discuss the concepts of consequence of failure and probability of failure, and then discuss how to use these concepts in the calculation of criticality for City assets.

ACTION ITEMS:

Engineering, Management – Develop an approach to evaluate consequence of failure

Engineering, Management – Develop an approach to evaluate probability of failure

Engineering, Management – Review and adopt proposed approach to calculate criticality and corresponding decision matrix

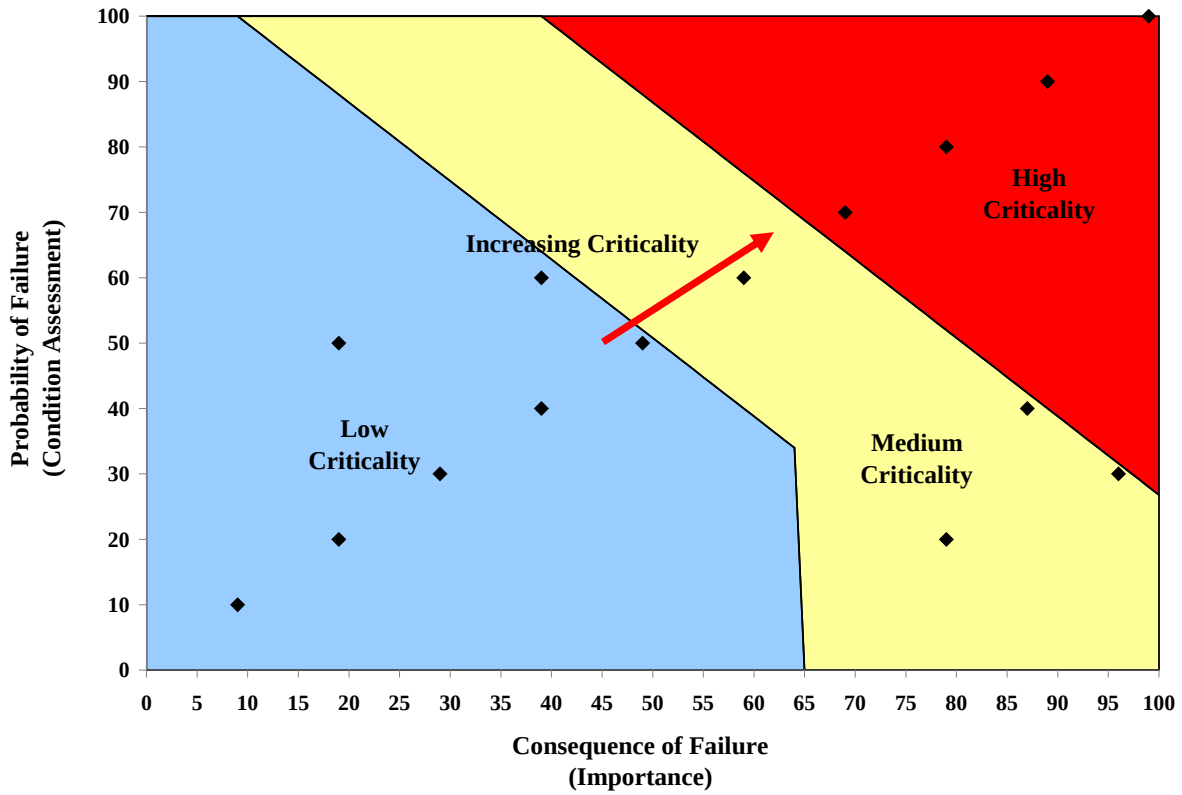
GIS – Calculated criticality and implement into future asset management activities

Engineering, Management – Commit to re-evaluate approach to criticality and improve the evaluation and decision system as additional data becomes available

DISCUSSION OF ISSUES:

Figure 2-1 depicts the theory of criticality. Criticality is the combined consideration of consequence of failure and probability of failure. As shown in Figure 2-1, the greater the probability of failure, and the more important a pipe is, the higher it will be ranked in criticality.

Figure 11-1
Criticality (Risk)



In order to calculate criticality, it is necessary to first evaluate its two individual components. Of these two components, consequence of failure and probability of failure.

Consequence of Failure

Consequence of failure is an estimate of the importance of a pipe based on the impacts that would result if the pipe were to fail. The repercussions of sudden failure can come from public perception, public safety, health concerns, and other factors. The reliability that the pipe adds to the system is also a factor that is considered in rating its consequence of failure. For example, an 8" sewer main that receives the wastewater from 3 houses is obviously not as vital to the reliability and performance of the Orem City sewer system as the 30" pipe on 1200 West that is fed by more than half of the City.

It should be noted that consequence of failure refers to the overall importance of a pipeline ***without consideration*** of its condition. In other words, if there are two pipelines that are identical in every way except that one is in excellent condition and the other is nearing failure, they will still have the same consequence of failure. For asset management purposes, pipeline condition is considered separately as "probability of failure" (to be discussed subsequently). To make wise decisions regarding pipeline maintenance, the City will obviously need to consider both consequence of failure and probability of failure. However, to make sure both issues are

considered and weighed appropriately, these concepts need to be discussed and considered separately first.

Possible Consequence of Failure Rating System

While it is easy to understand the general principle behind consequence of failure, it is much more difficult to implement a rating system to accurately represent consequence of failure. While some consequences are easy to quantify from pipe to pipe (e.g. pipeline replacement costs), most consequences of failure are much more difficult to represent quantitatively (e.g. impacts to health and safety or results of regulatory violations). Instead of trying to quantify each category of consequence, BC&A recommends using a number of easily quantifiable factors to rank the pipes. This ranking gives a relative indication of consequence of failure. Four factors are recommended to estimate the consequence of failure of a sewer pipe: the flow rate in the pipe, the category of road over the pipe, the zoning of the area, and the depth of the pipe.

Sewer Flow Rate

Flow rate in a sewer pipe is the single most important indicator of the importance of a pipe. In most situations, the higher the flow rate, the larger the area that pipe serves. Pipes that have a higher flow rate that do not service a large area still need to have a have a higher consequence of failure rating than pipes with lower flow rates. Bypass pumping cost, the risk of property damage, environmental and regulatory consequences, the cost of pipe replacement, and problems from sewage backing up in the system are all greater for larger flow rates. In a worst case scenario, if a pipe collapses or becomes blocked and the manholes surcharge resulting in wastewater flows in basements and the street, there is a greater health hazard to the public with a larger wastewater flow rate.

One approach is to use the average day flow rate, measured in MGD, as the base rating for the consequence of failure for each pipe. The other three factors that influence the rating can then be used as multipliers to adjust the sewer flow rate to produce a final rating. Table 2-1 contains a list of sample multipliers that could be assigned to each rating factor. This is not necessary a recommendation of final values that should be used by the City, but a starting point for discussion.

Table 2-1
Consequence of Failure Multipliers

Road Class	Multiplier	Zone	Multiplier	Depth	Multiplier
No Road or Residential	1	Open Space/ Industrial	1	0-12	1
Collector	1.2	Residential	1.5	12-20	1.2
Major Arterial	3	Commercial/ Institutional	1.7	20+	1.4
Freeway	10	Downtown	2.0		
Canal X-ing	5				
Rail X-ing	10				

An explanation of each classification and its possible multiplier is included in the following sections.

Road Category

There is a direct connection between the density of traffic and the cost and time associated with maintenance and repairs on sewer pipes. For the purposes of discussion, BC&A grouped streets into four major classifications: interstates, major arterials, collector streets and residential streets.

- ***Interstates*** – Interstates are assigned the highest ranking, because the cost of crossing the freeway is significantly higher than traditional pipe installation methods. The risks to property and potential social disruption impacts that may result if traffic is affected are additional impacts that are considered in this category. The proposed multiplier for the pipes under the freeway was set to be high enough to generally push these pipes into the highest level of consequence of failure. It should be noted, however, that pipes that are in a road that is associated with a freeway underpass would not receive a freeway rating. They would receive the same rating as the road in the underpass.
- ***Major arterials*** – The next classification is the major arterials. They would include State Street and other multi-lane major streets. More disruption would result from traffic control for work on these streets than streets in the other categories. The time and money associated with maintaining the pipes in these streets is fairly high.
- ***Collector Streets*** – The third classification in this category is the collector streets. These streets do not have the volume of traffic that the major arterials have, but still have more traffic than residential streets. Their multiplier is reflective of the traffic volume.
- ***Residential Streets*** – The fourth classification in this category is residential and other small streets. These streets have the smallest volume of traffic and do not add to the criticality ranking of a pipe. Pipes not located in roadways were also included in this classification.

Also included in the road category is consideration of two additional types of crossings, canal and railroad crossings with multipliers as shown in Table 2-1.

Zoning

Zoning is also a factor that impacts the consequence of failure rating. A sewer pipe in an open field will not have as large a consequence of failure as the same sized pipe located downtown or in commercial areas. For this analysis, zoning has been grouped into 4 classifications:

- ***Downtown*** – Pipes in the downtown area are more expensive and time consuming to repair and maintain due to traffic control and general city congestion. If there is an unexpected failure in downtown, there is also a higher probability that the failure will cause property damage. Public health concerns are also higher because of the higher

population density. Therefore, the weighting of the downtown zoning is higher than other areas.

- ***Commercial*** – In commercial areas of the City, the same concerns exist as documented for downtown areas, but to a lesser degree. Therefore, the commercial zoning multiplier is lower than downtown but higher than other zones.
- ***Residential*** – Residential areas do not generally have the same potential for costly impacts as do congested commercial and downtown areas. However, they do have more potential for adverse public health effects than do areas of industrial or open space zoning.
- ***Open Space and Industrial*** – Areas zoned for industrial or open space are assumed to have the least impact from a failed pipe.

Depth of Pipe

The depth of the pipe can have a significant impact on the cost of repairs and rehabilitation of sewer pipe. Extensions on backhoes, very wide trenches, possible dewatering, etc. make repairs and maintenance much more expensive and time consuming on deeper pipes. For the purpose of this analysis, the depth of pipe was grouped into 3 categories:

- ***Less than 12 feet*** – Pipes that are less than 12 feet deep can generally be maintained and repaired using standard construction techniques.
- ***12 to 20 feet*** – Once the depth of a pipeline exceeds 12 feet, repairs and maintenance begin to become more expensive and can be more time consuming. Additional equipment and special construction techniques add to the cost of working on these deep pipes.
- ***Over 20 feet*** – A pipe that is over 20 feet deep will require even more special equipment and construction techniques.

Categories for Consequence of Failure

One a system has been established, the consequence of failure can be calculated for each pipe. To avoid overcomplicating the issue, BC&A has found it prudent to divide facilities into just three consequence of failure categories (Level 1, 2, and 3 ratings). The consequence of failure is relative only to the rest of the system. The top 5 percent of the pipe ratings are identified as Level 1, the most important pipes in the system. The next 10 percent of the pipes have a consequence of failure rating 2. The rest of the pipes are rated Level 3 (remaining 85 percent of the system).

Consequence of Failure for Manholes

The consequence of failure of for manholes is directly related to the consequence of failure of its adjacent pipes. Because the purpose of manholes is to service sewer pipes, each manhole's rating can be set to match its associated sewer pipes' rating. If a manhole touches two or more pipes with different consequence of failure rating levels, the manhole rating can be set to match the highest pipe rating.

Probability of Failure

The second component of criticality is probability of failure. For the purpose of this discussion, failure is limited to consideration of loss of structural integrity. Other failure causes such as natural disasters, vandalism, or damage by contractors are not discussed in this evaluation because there is no way to predict these types of events for individual pipe segment.

Ideally, probability of failure would be defined in terms of an actual probability (i.e. a given segment of pipe has an estimated __% chance of failure in a given year). This would allow for a statistical evaluation of each pipe which would compare the expected cost of continuing without rehabilitation verses the cost of rehabilitation. Unfortunately, estimating the actual probability of failure for a sewer pipe requires an extensive data set on pipe condition and attributes and also extensive information on historic failures that have occurred. The City does not yet have this type of data available. It has been recommended that the City implement improved pipe condition assessment and subsequent tracking of pipe condition over time as part of this master plan effort; however, until this data is collected over the next several years, the City will have to use a less detailed approach to probability of failure.

Given the limited amount of pipe condition data, BC&A would propose initially establishing a structural level of service rating for each pipeline based on PACP scores to define the probability of failure for each pipeline. While this does not assign a specific probability of failure for each pipe, it does give a general indication of the condition of each pipe. In general terms, the lower the level of service rating a pipe has, the higher its probability of failure. Possible probability of failure ratings based on PACP scores are summarized below.

- **Level of Service Grade A –** The PACP structural rating does not exceed 0.35.
- **Level of Service Grade B –** The PACP structural rating falls between 0.35 and 0.5.
- **Level of Service Grade C –** The PACP structural rating falls between 0.5 and 0.65.
- **Level of Service Grade D –** The PACP structural rating falls between 0.65 and 0.8.
- **Level of Service Grade E –** The PACP structural rating falls between 0.8 and 1.0.
- **Level of Service Grade F –** The PACP structural rating exceeds 1.0.

Increasing Probability Of Failure

As additional data for the system becomes available over time, it is recommended that the City revisit probability of failure. It can then be expanded to consider additional factors, potentially including items such as H2S level, pipe age, pipe material, etc. Ultimately, it should be the goal of the City to estimate an actual probability of failure for each pipeline.

Criticality

With probability and consequence of failure defined for each pipe segment, criticality can be calculated. Given the City's current limitations in data, a good place to start would be a criticality matrix as shown in Table 2-2. Instead of using discrete data points for probability of failure and

consequence of failure, this matrix groups this information into basic level of service grades for probability of failure and consequence of failure levels. As additional information is gathered in the future, the matrix can be refined. Criticality in the matrix increases from the lower left corner to the upper right.

Table 2-2
Criticality – Recommended Actions Based on Structural Rating

Structural Level of Service	**Pipe Importance Level 3** Recommended Action	**Pipe Importance Level 2** Recommended Action	**Pipe Importance Level 1** Recommended Action
F	Mid Term Pipe Replacement / Rehabilitation Project	Short Term Pipe Replacement / Rehabilitation	Immediate Pipe Replacement / Rehabilitation
E	Short Term Inspection Schedule	Mid Term Pipe Replacement / Rehabilitation	Short Term Pipe Replacement / Rehabilitation
D	Mid Term Inspection Schedule	Short Term Inspection Schedule	Mid Term Pipe Replacement / Rehabilitation
C	Long Term Inspection Schedule	Mid Term Inspection Schedule	Short Term Inspection Schedule
B	Long Term Inspection Schedule	Mid Term Inspection Schedule	Mid Term Inspection Schedule
A	Long Term Inspection Schedule	Long Term Inspection Schedule	Mid Term Inspection Schedule

Increasing Probability of Failure

Increasing Consequence of Failure

Included in the matrix are recommended actions based on criticality. The intent of the recommended actions is to provide guidelines for the decision making process and focus resources on the assets which are most critical. The recommended actions include both inspection activities and rehabilitation activities. In both cases, the recommended schedule for the time frames listed in the table are as follows:

Immediate	0-1 year
Short Term	1-4 years
Mid Term	4-8 years
Long Term	More than 8 years

It should be noted that this matrix is only a starting point. Two things should be remembered as it is used to help develop future rehabilitation and inspection schedules:

- First, the matrix is not intended as a replacement for engineering judgment. As each pipeline is evaluated, additional issues not covered by the matrix will need to be considered by City personnel when making final rehabilitation and replacement decisions. For example, if a pipe is generally good condition, but has one isolated structural problem, its overall level of service rating may be relatively high. As a result, it may be classified as a low criticality pipeline even though the isolated problem may merit immediate attention. In these cases, it is expected that City personnel will use their judgment to increase the criticality of the pipeline and accelerate resolution of the problem. Despite this limitation, it is believed that using the matrix to augment engineering judgment will enable better asset management than relying on institutional knowledge only.

- Second, the proposed matrix has been developed using limited knowledge and information about the City's system. As additional data is collected, there is significantly more analysis the City will be able to do regarding criticality. Some sewer agencies are using the criticality information and cost data to assign a cost of failure and rating the payback of inspections and other maintenance activities. This type of analysis can provide an agency with the best operation and maintenance returns on limited budget resources. It is recommended that the City review this matrix periodically to review the recommended actions and identify possible improvements to the evaluation procedure. Ultimately, the goal of the City is to adopt best practices and maximize the use of resources in addressing system management needs.

APPENDIX E
TECH MEMO:
UNIVERSITY MALL
DEVELOPMENT EVALUATION

Bowen Collins
& Associates, Inc.
CONSULTING ENGINEERS

TECHNICAL MEMORANDUM

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FROM: Andrew McKinnon
Bowen, Collins & Associates
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DATE: September 15, 2015

SUBJECT: University Mall Development Evaluation

BACKGROUND

Woodbury Corporation has proposed redeveloping the area of the University Mall. The developer has already submitted a detailed road and utility design to the City and it has been reviewed by the Orem City Development Review Committee (DRC). As part of this process, Orem City provided the DRC response dated July 07, 2015 to Bowen, Collins & Associates and has requested that BC&A review development calculations for water, sewer, and storm water to provide feedback regarding the overall impact of the development on the City's water, sewer, and storm water master plans. The purpose of this technical memorandum is to summarize these impacts.

PROPOSED DEVELOPMENT

The concept development of the property is shown in Figure 1. The developer has since developed detailed site and utility plans, but Figure 1 does a good job of summarizing the goals and location of the project.

The developer provided estimates of water and sewer demand for the proposed structures on the site (as detailed subsequently). It is unclear what standard was used for demand estimates. However, based on the demands calculated, estimates appear to be reasonably conservative (and somewhat high in some cases) for peak day and peak instantaneous water demands. Sewer production and peak instantaneous sewer production appear to be somewhat overly conservative.

Fire flow demand was stated to be 2,000 gpm. It is unclear from the DRC response whether the stated fire flow has been reviewed by the City's Fire Marshall or not. It is also unclear from the DRC response what height proposed structures on the site will be. For the purpose of this evaluation, 4,000 gpm

will be used as the required fire flow as a conservative estimate. Required fire flows should be reviewed by the City's Fire Marshall prior to approval.

BUILDOUT MODELING

To determine how the proposed development may affect City master planning for this area under buildout conditions, projected flows for the development were compared to projections in the City's master plans. Table 1 compares projections from the City's master plans to the proposed development.

Table 1
Comparison of Master Plan Requirements to Proposed Development

Critical Planning Flow	Master Plan	Development Projections	Percent Difference
New ERUs proposed as part of University Mall Redevelopment[4]	1,100	3,300	300%
Sewer Peak Instantaneous Production (gpm)[1]	404	1,341	232%
Water Fire Flow (gpm)	3,000	2,000	-33%
Water Peak Day Demand (gpm) [1]	623	1,341	115%
Water Peak Instantaneous Demand (gpm)[2]	1,121	2,414	115%
Sump Infiltration Rate (in/hour)[3]	2	4	100%

[1]Developer provided estimates of peak instantaneous sewer production and peak day demand for the initial phase of the University Mall redevelopment as part of the July 7, 2015 submittal. This included flows of approximately 845.8 gpm for peak instantaneous sewer production and peak day water demand. BC&A used developer provided unit production for similar type development for other parts of the University Mall development to estimate peak instantaneous sewer production and peak day water demand for future phases of the University Mall redevelopment.
[2]Historical flow meter data provided by the City indicates that City wide demands have a peaking factor of 1.8 for peak instantaneous demands compared to peak day demands. BC&A applied a peaking factor of 1.8 to developer provided estimates of peak day demand to calculate the peak instantaneous demand.
[3]The planning infiltration rate for new sumps and detention facilities was 2 inches/hour in the City's master plan if soil information was not available. Observed infiltration rates at several existing detention basins in Orem City were calculated to be approximately 3.3 inches/hour to 4 inches/hour.
[4]The City's estimated indoor water use per equivalent residential connection (gpd) is approximately 200 gpd based on calculations from the City's sewer master plan. Proposed nonresidential and residential development production estimates result in 650,000 gpd of additional sewer production.

Water Modeling

For the purpose of this evaluation, BC&A used a measured City-wide peaking factor of 1.8 for peak instantaneous demand for evaluation purposes. This was applied to developer provided estimate of peak day demand to estimate the impact of water demands on the system. In addition, a fire flow of 4,000 gpm was evaluated for peak day demands because no information was provided on building construction type or heights. Table 2 summarizes the range of pressures and flows available to the development based on the pipe diameters indicated in Figure 2.

Table 2
Available Fire Flow and Pressures For Buildout Conditions

Location[1]	Peak Instantaneous Demand Pressure without Fire Flow[2] (psi)	Peak Day Demand Pressure (static) Before Fire Flow (psi)	Fire-Flow Demand (gpm)	Residual Pressure at Fire Flow (psi)	Available Flow at 20 psi[3] (gpm)
Minimum	67	73	4,000	60	8,000
Maximum	70	77	4,000	73	8,000

[1] – The location for pressures indicated varies, but only refers to available pressures and flows at the main distribution line in front of buildings. Actual pressures at connections to buildings will depend on the size and length of lateral connections. Available pressure and flow at the top of proposed structures will also vary depending on building height.
[2] – Orem City's desired criteria requires at least 50 psi of pressure in the water main during peak instantaneous demand.
[3] – The State of Utah and the Orem City fire marshal require the system to satisfy required fire flow demands with a minimum residual pressure of 20 psi in the main. Note that more than one hydrant or a pumped fire connection would be required to produce the available flow shown.

Based on estimated demands, there is adequate pressure and flow at proposed distribution mains around the building. This is primarily a function of the 16-inch diameter main to the south of the University Mall. Most flow for the development is carried by this pipe. No information regarding building height was provided. Available pressure and flow at the top of structures should be evaluated prior to finalizing pipe diameters.

Sewer Modeling

The developer provided peak instantaneous sewer production numbers for the initial phase of the University Mall redevelopment project (up to 846 gpm). For reference purposes, the DRC Reponse for July 7, 2015 will be referred to as Phase 1 of University Mall redevelopment. Based on the provided values, peak instantaneous production appears to be relatively conservative and was used for evaluation of development sewer collection pipes. BC&A used developer provided peak production estimates to project potential flow from remaining portions of the University Mall redevelopment project. Based on developer provided calculations, peak instantaneous sewer production for the University Mall redevelopment are significantly higher than estimates in the City's sewer master plan. These peak instantaneous flows were simulated in the City's buildout sewer model and resulted in deficiencies along long reaches of the 1200 South sewer trunk line (up to 9,000 feet) as a result of the relatively aggressive projections of production and peaking factors used by the developer's engineer.

Using a recent sewer production study for a sewer district in Salt Lake County, revised sewer production values were estimated by BC&A to assess the potential effects of University Mall redevelopment. A comparison of estimated equivalent residential units for buildings proposed as part of University Mall is listed in Table 3.

Table 3
Proposed Buildings and Associated Equivalent Residential Units (ERUs)

Building	Description	Size (SF/Units)	Developer Projection of ERUs	Revised Master Plan Projection of ERUs
Hotel	Hotel	120	75	36
Office R	Office	30,000	15	8
Retail O	Retail	9,088	5	1
Office AA	Office	100,000	50	25
Office P	Office	208,295	104	52
Retail P	Retail	6,944	3	1
Residential AA	Residential	500	500	400
Office BB	Office	100,000	50	25
Retail BB	Retail	20,000	10	3
Restaurant BB	Restaurant	10,000	50	20
EM11	Shopping Center (Retail/Restaurant)	8,778	9	6
EM9	Shopping Center (Retail/Restaurant)	25,741	26	17
EM5	Shopping Center (Retail/Restaurant)	76,719	77	51
EM5 Office	Office	2,544	1	1
EM3	Shopping Center (Retail/Restaurant)	26,441	26	18
EM2	Shopping Center (Retail/Restaurant)	21,349	21	14
Inflow L (North of Macys)	Residential	41	123	41
Inflow L (North of Macys)	Restaurant	20,000	100	41
Inflow L (North of Macys)	Retail	175,000	88	27
Retail A	Retail	18,000	9	3
Retail C	Retail	6,000	3	1
Ex Macys	Retail	207,537	104	32
Retail Q	Retail	15,000	8	2
Office Q	Office	200,000	100	50
Residential	Residential	125	125	100
Residential	Residential	125	125	100
Residential	Residential	125	125	100
Residential	Residential	125	125	100
Theatre	Retail	66,193	33	10
Residential	Residential	450	450	360
Residential	Residential	578	578	462
EM11	Shopping Center (Retail/Restaurant)	154,762	155	103
Total			**3,272**	**2,273**

Orem City personnel considered the peaking factors used by the developer's engineer to be appropriate for local pipe sizing. However, for the City's sewer trunk line, developer calculations may be overly conservative because the effects of multiple production patterns and attenuation should be considered. For City trunk lines, the revised master plan projections listed in Table 3 will be used to evaluate the capacity of City trunk lines.

Table 4 summarizes flows for the portion of the development evaluated by the developer's engineer along with buildings and required pipe sizes.

Table 4
Peak Production in Sewer Mains for Phase 1
and Required Sewer Main Size

Pad	Developer Estimate of Peak Instantaneous Production at Building (gpm)	Developer Estimate of Peak Instantaneous Production Into Sewer Main (gpm)	Required Pipe Size (in) and Slope
Hotel	41.67	41.67	8" @0.4%
Office R	5.21	46.88	8" @0.4%
Retail O	1.58	48.45	8" @0.4%
Office AA	17.36	65.81	8" @0.4%
Office P	36.16	101.98	8" @0.4%
Retail P	1.21	103.18	8" @0.4%
Theater w/ Expansion	32.39	32.39	8" @0.4%
Aston Court Portion	85.33	117.72	8" @0.4%
Residential AA	277.78	395.50	10" @0.4%
Office BB	17.36	516.04	12" @0.38%
Retail BB	3.47	519.52	12" @0.38%
Restaurant BB	27.78	547.29	12" @0.38%
EM11	3.66	550.95	12" @0.38%
EM9	10.73	561.68	12" @0.38%
EM5	31.97	593.64	12" @0.38%
EM5 Office	0.44	594.08	12" @0.38%
EM3	11.02	605.10	12" @0.38%
EM2	8.90	614.00	12" @0.4%
Inflow L (North of Macys)	68.33	68.33	8" @0.59%
Inflow L (North of Macys)	55.56	123.89	8" @0.59%
Inflow L (North of Macys)	30.38	154.27	8" @0.59%
Retail A	3.13	157.40	8" @0.59%
Retail C	1.04	772.43	12" @0.54%
Ex Macys	36.03	808.46	12" @0.54%
Retail Q	2.60	811.07	12" @0.49%
Office Q	34.72	845.79	15" @0.49%

Based on model results for the system, redevelopment at the University Mall will result in two required projects:

1. **Modification to Developer Improvements –** Flow for pipes with stationing 300+00 to 303+69 (in drawing C3.0) do not consider existing flows in the sewer main that will be collected nor some potential redevelopment elsewhere in the University Mall area. Based

on existing flows and projected growth, the pipes between 300+00 to 303+69 should be 10-inch.

2. **1200 South Pipeline Replacement –** The City's existing sewer trunk line along 1200 South ranges in pipe size from 12-inch to 15-inch with slopes as flat at 0.6% with an average slope of 3%. Based on the existing trunk line size, Project SS6 from the City's sewer master plan will need to be extended by approximately 500 feet as shown in Figure 3.
3. **Future Development Phases –** If possible, it is recommended that future phases of redevelopment direct flow north to 800 South to utilize available capacity in the 800 South sewer main. Local improvements may be needed to accommodate high density growth and future phases of redevelopment could affect the timing of Project SS10 if redevelopment is directed to 800 South.

Storm Water Modeling

The University Mall redevelopment projects lies within an area where sumps are appropriate according to the City's storm water master plan. Sumps should be used to detain and infiltrate all of the 10-year storm event. Based on the soil reports provided by the developer's engineer, it appears that the infiltration rate for the area will be appropriate to use sumps. However, it should be noted that the City's storm water master plan requires that any event above the 10-year storm event must be capable of being conveyed away from private properties without causing any damage. Low points identified for sumps in the developers utility plan should therefore be equipped with overflows as needed to avoid damaging property. For example, the maximum depth for storm water should not exceed 12-inches for areas with vehicles to avoid damaging property. BC&A did not perform a thorough review of the site grading plan, but this should be considered for sumps at low points on the site.

SHORT-TERM MODELING

Because the City's buildout model includes master plan level improvements to accommodate buildout demands, the impact of critical planning flows on existing facilities also needs to be evaluated.

Water Modeling

Projected peak demands for the development were added to the existing scenario in the City's water model. Table 5 summarizes model results.

Table 5
Available Fire Flow and Pressures For Existing Conditions

Location[1]	Peak Instantaneous Demand Pressure without Fire Flow[2] (psi)	Peak Day Demand Pressure (static) Before Fire Flow (psi)	Fire-Flow Demand (gpm)	Residual Pressure at Fire Flow (psi)	Available Flow at 20 psi[3] (gpm)
Minimum	69	75	4,000	61	8,000
Maximum	71	85	4,000	74	8,000

[1] – The location for pressures indicated varies, but only refers to available pressures and flows at the main distribution line in front of buildings. Actual pressures at connections to buildings will depend on the size and length of lateral connections. Available pressure and flow at the top of proposed structures will also vary depending on building height.
[2] – Orem City's desired criteria requires at least 50 psi of pressure in the water main during peak instantaneous demand.
[3] – The State of Utah and the Orem City fire marshal require the system to satisfy required fire flow demands with a minimum residual pressure of 20 psi in the main. Note that more than one hydrant or a pumped fire connection would be required to produce the available flow shown.

As with flows at buildout, it does not appear that proposed redevelopment at the University Mall will result in any water system deficiencies. Again, no information regarding building height was provided. Available pressure and flow at the top of structures should be evaluated prior to finalizing pipe diameters.

Sewer Modeling

Developer estimates of timing indicate that structures in Table 3 may be constructed as early as 2017. Based on flow monitoring conducted in July 2010 and estimated sewer production for 2014, the available capacity of the 1200 South sewer trunk was evaluated to determine how many equivalent residential units may be developed before any sewer trunk line improvements will need to be completed. Table 5 summarizes available ERUs that may be constructed before the improvements along 1200 South must be constructed.

Table 5
Available ERUs for Phases of University Mall Redevelopment

Construction Phasing	Flow (gpm)	ERUs
Available Capacity in 1200 South	585	2,000
Proposed Phase 1 Development*	432	1,556
Existing University Mall Development to be Demolished	24	85
Remaining 1200 South Capacity	177	529

*includes development listed in Table 3 with an estimate of 200gpd/ERU

Based on the number of ERUs proposed as part of Phase 1, it would appear that Phase 1 of the development can be constructed without exceeding the capacity of existing pipes. However, because of the relatively high projections of flow submitted by the developer, it is recommended that the City conduct flow monitoring at 815 West College Drive in the near future to verify available capacity for

existing conditions. It may also be useful to flow monitor at 1200 South 475 East to assess sewer flows as redevelopment occurs.

Redevelopment at the University Mall is not anticipated to affect the timing of Project SS7.

Storm Water Modeling

The proposed development will not affect the timing of any storm drain master plan projects.

CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and recommendations can be made based on the evaluation performed for this technical memorandum:

- Buildout Modeling – Developer calculations for indoor demands use relatively conservative assumptions. Based on those assumptions, the following conclusions can be made regarding building infrastructure:
    - Water – No changes have been identified to developer proposed pipe sizes based on available data. No data was provided for building heights. Available pressures and flows for buildings will therefore need to be evaluated before approval.
    - Sewer – Approximately 500 ft more sewer main on 1200 South will need to be replaced as a result of University Mall redevelopment as compared to the City's sewer master plan. The additional length could potentially be mitigated by directing more redevelopment flow north to 800 South, but will depend on the timing of growth and available capacity of existing 8-inch mains in 800 South.
    - Storm Water – No changes will be required for the storm water system at buildout.
- Short-Term Modeling – Replacement of the sewer pipeline in 1200 South is not required for Phase 1 of the University Mall redevelopment, but may be required before any subsequent redevelopment phases can proceed. All of the Phase 1 buildings in Table 3 may be completed as early as 2017. All of the University Mall redevelopment is projected to be completed by 2025. As a result, no change in the anticipated timing of SS6 is anticipated as a result of Phase 1.
- Flow Monitoring – It is recommended that the City conduct flow monitoring at 875 West College Drive in the near future to verify existing flows and confirm how much remaining capacity there is in the 1200 South sewer trunk line. This will assist in determining the required timing of Project SS6. Occasional flow monitoring at 1200 South 475 East will help assess the effects of growth on sewer production as a result of redevelopment and will help to assess the accuracy of sewer production projections.

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& Associates, Inc.
CONSULTING ENGINEERS

DRAFT

EXHIBIT B

SEWER RATE STUDY

SEWER UTILITY
OREM CITY, UTAH

MARCH 2016

PREPARED BY
LEWIS YOUNG ROBERTSON & BURNINGHAM, INC.

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SECTION I: EXECUTIVE SUMMARY

The City of Orem ("City") commissioned Lewis Young Robertson & Burningham, Inc. ("LYRB") to review the existing sewer utility fees (or rates) and provide a recommended rate schedule based on changes in forecasted expenses, capital improvements and bonding needs. The primary objectives of the rate analysis were to ensure sufficient revenues to cover all operation and maintenance (O&M) expenses while maintaining bond covenants, ensuring the appropriate debt service coverage ratio, and providing sufficient revenue to fund the proposed projects identified in the Master Plan and Capital Improvement Plan ("CIP").

A review of projected revenues under the existing rate structure relative to proposed expenses illustrated that the City would not have sufficient revenues to fund the needed capital improvements without a rate increase. As a result, City staff, the City Council and consultants evaluated many potential rate scenarios during the study phase of this analysis, with the City ultimately focusing on four scenarios:

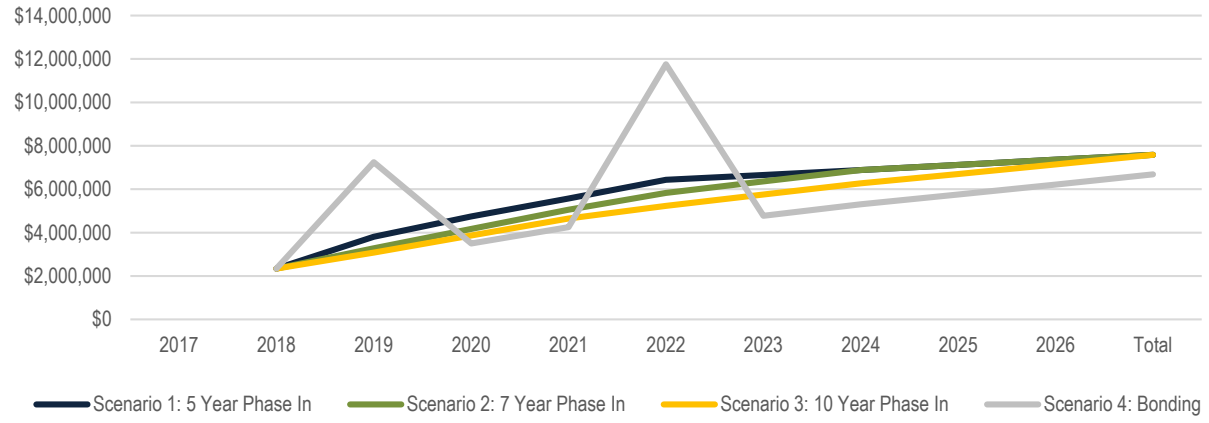
- **Scenario 1** – Phasing the proposed CIP over a five (5) year period with no new debt;
- **Scenario 2** – Phasing the proposed CIP over a seven (7) year period with no new debt;
- **Scenario 3** – Phasing the proposed CIP over a ten (10) year period with no new debt; and,
- **Scenario 4** – Phasing the proposed CIP over a five (5) year period with new debt.

The rate scenarios shown below are structured to produce a final base rate of $16.03 within ten years and a usage rate of $3.66 per 1,000 gallons. The annual rate increase curve for each scenario is adjusted to reflect the changes in the CIP (See **Figure 1.1**), with Scenarios 2-4 funding a reduced CIP in order to allow for a more moderate annual increase in the rates.

TABLE 1.1: ILLUSTRATION OF PROPOSED RATE INCREASE SCENARIOS

	Scenario 1: 5 Year Phase In		Scenario 2: 7 Year Phase In		Scenario 3: 10 Year Phase In		Scenario 4: Bonding	
	Base (per month)	Usage Charge (per 1K gal)	Base (per month)	Usage Charge (per 1K gal)	Usage Charge (per 1K gal)	Usage Charge (per 1K gal)	Base (per month)	Usage Charge (per 1K gal)
2016	**$9.32**	**$1.42**	**$9.32**	**$1.42**	**$9.32**	**$1.42**	**$9.32**	**$1.42**
2017	$9.32	$1.42	$9.32	$1.42	$9.32	$1.42	$9.32	$1.42
2018	$9.32	$2.13	$9.32	$1.85	$9.32	$1.85	$9.32	$1.85
2019	$10.72	$2.45	$10.72	$2.18	$10.44	$2.07	$10.25	$2.07
2020	$12.11	$2.77	$12.33	$2.53	$11.69	$2.32	$11.28	$2.32
2021	$13.44	$3.07	$13.56	$2.78	$12.86	$2.55	$12.41	$2.55
2022	$14.11	$3.22	$14.37	$3.00	$13.89	$2.75	$13.40	$2.75
2023	$14.67	$3.35	$14.94	$3.24	$14.72	$2.97	$14.34	$2.97
2024	$15.11	$3.45	$15.39	$3.40	$15.31	$3.21	$15.06	$3.21
2025	$15.56	$3.55	$15.77	$3.57	$15.72	$3.47	$15.59	$3.47
2026	**$16.03**	**$3.66**	**$16.03**	**$3.66**	**$16.03**	**$3.66**	**$16.03**	**$3.66**
10-YR CIP		**$58,522,205**		**$55,994,367**		**$52,636,668**		**$57,824,284**
Fund Balance (Year 10)		**$4,428,295**		**$4,332,297**		**$4,345,164**		**$4,174,467**

FIGURE 1.1: PROPOSED CIP FUNDING



Each scenario assumes an annual growth of one percent in connections. Annual Operation and Maintenance ("O&M") expenditures are assumed to increase by three percent annually. The comparison of revenues and expenditures under the proposed rate increases illustrates that the City will continue to maintain the necessary debt service coverage ratios, while providing necessary funding for capital improvement and replacement projects according to the proposed CIP scenarios. While the fund balance is anticipated to increase slightly over time under each scenario, the proportional "Days of Working Capital" will decline as a result of increasing operations and maintenance expenditures. However, the fund balances will achieve the minimum set by the City of maintaining at least 50 percent of O&M expenses in reserve funds by Year 10.

TABLE 1.2: SUMMARY PRO FORMA – SCENARIO 1

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 10
Base Rate (per Month)	**$9.32**	**$9.32**	**$10.72**	**$12.11**	**$13.44**	**$16.03**
Usage Charge (per Month)	**$1.42**	**$2.13**	**$2.45**	**$2.77**	**$3.07**	**$3.66**
Calculated Connections	23,089	23,320	23,553	23,789	24,026	25,252
Total Operating Revenue	7,955,408	9,804,902	11,054,200	12,308,935	13,503,638	16,046,719
Total Operating Expense	(4,876,421)	(5,351,532)	(5,709,780)	(6,072,388)	(6,426,359)	(7,564,341)
Total Non-Operating Revenue	39,523	39,918	40,317	40,720	41,128	43,226
Total DS	(594,000)	(594,000)	(594,000)	(594,000)	(594,000)	(595,000)
Total CIP	(2,340,665)	(3,808,706)	(4,748,215)	(5,574,372)	(6,435,555)	(2,751,470)
Net Income (Loss) Before Transfers	183,845	90,582	42,522	108,896	88,851	344,044
Change in Net Position after Transfers and Contributions	130,162	36,363	(12,239)	53,587	32,989	285,332
Beginning Fund Balance	2,895,824	3,025,986	3,062,350	3,050,111	3,103,698	4,142,963
Ending Fund Balance (Unrestricted)	**$3,025,986**	**$3,062,350**	**$3,050,111**	**$3,103,698**	**$3,136,687**	**$4,428,295**
Fund Balance as % of O&M	**62%**	**57%**	**53%**	**51%**	**49%**	**59%**
Days of Working Capital	**223**	**206**	**192**	**184**	**176**	**211**
Coverage Ratio	**5.18**	**7.50**	**9.00**	**10.50**	**11.91**	**14.26**

TABLE 1.3: SUMMARY PRO FORMA – SCENARIO 2

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 10
Base Rate (per Month)	**$9.32**	**$9.32**	**$10.72**	**$12.33**	**$13.56**	**$16.03**
Usage Charge (per Month)	**$1.42**	**$1.85**	**$2.18**	**$2.53**	**$2.78**	**$3.66**
Calculated Connections	23,089	23,320	23,553	23,789	24,026	25,252
Total Operating Revenue	7,955,408	9,089,638	10,364,482	11,758,654	12,797,428	16,046,719
Total Operating Expense	(4,876,421)	(5,208,479)	(5,571,837)	(5,962,332)	(6,285,117)	(7,564,341)
Total Non-Operating Revenue	39,523	39,918	40,317	40,720	41,128	43,226
Total DS	(594,000)	(594,000)	(594,000)	(594,000)	(594,000)	(595,000)
Total CIP	(2,339,818)	(3,282,893)	(4,170,292)	(5,053,328)	(5,831,885)	(2,751,470)
Net Income (Loss) Before Transfers	184,691	44,184	68,671	189,715	127,554	344,044
Change in Net Position after Transfers and Contributions	131,009	(10,035)	13,909	134,406	71,692	285,332
Beginning Fund Balance	2,895,824	3,026,833	3,016,798	3,030,707	3,165,113	4,046,965
Ending Fund Balance (Unrestricted)	**$3,026,833**	**$3,016,798**	**$3,030,707**	**$3,165,113**	**$3,236,805**	**$4,332,297**
Fund Balance as % of O&M	**62%**	**58%**	**54%**	**53%**	**51%**	**57%**
Days of Working Capital	**223**	**209**	**196**	**191**	**185**	**206**
Coverage Ratio	**5.18**	**6.53**	**8.07**	**9.76**	**10.96**	**14.26**

TABLE 1.4: SUMMARY PRO FORMA – SCENARIO 3

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 10
Base Rate (per Month)	**$9.32**	**$9.32**	**$10.44**	**$11.69**	**$12.86**	**$16.03**
Usage Charge (per Month)	**$1.42**	**$1.85**	**$2.07**	**$2.32**	**$2.55**	**$3.66**
Calculated Connections	23,089	23,320	23,553	23,789	24,026	25,252
Total Operating Revenue	7,955,408	9,089,638	10,004,348	11,039,511	12,008,068	16,046,719
Total Operating Expense	(4,876,421)	(5,208,479)	(5,499,810)	(5,818,503)	(6,127,245)	(7,564,341)
Total Non-Operating Revenue	39,523	39,918	40,317	40,720	41,128	43,226
Total DS	(594,000)	(594,000)	(594,000)	(594,000)	(594,000)	(595,000)
Total CIP	(2,339,818)	(3,082,893)	(3,870,292)	(4,653,328)	(5,231,885)	(2,751,470)
Net Income (Loss) Before Transfers	184,691	244,184	80,563	14,400	96,066	344,044
Change in Net Position after Transfers and Contributions	131,009	189,965	25,802	(40,909)	40,204	285,332
Beginning Fund Balance	2,895,824	3,026,833	3,216,798	3,242,599	3,201,691	4,059,832
Ending Fund Balance (Unrestricted)	**$3,026,833**	**$3,216,798**	**$3,242,599**	**$3,201,691**	**$3,241,894**	**$4,345,164**
Fund Balance as % of O&M	**62%**	**62%**	**59%**	**55%**	**53%**	**57%**
Days of Working Capital	**223**	**222**	**212**	**198**	**190**	**207**
Coverage Ratio	**5.18**	**6.53**	**7.58**	**8.79**	**9.90**	**14.26**

TABLE 1.5: SUMMARY PRO FORMA – SCENARIO 4

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 10
Base Rate (per Month)	**$9.32**	**$9.32**	**$10.25**	**$11.28**	**$12.41**	**$16.03**
Usage Charge (per Month)	**$1.42**	**$1.85**	**$2.07**	**$2.32**	**$2.55**	**$3.66**
Calculated Connections	23,089	23,320	23,553	23,789	24,026	25,252
Total Operating Revenue	7,955,408	9,089,638	9,950,647	10,922,471	11,878,325	16,046,719
Total Operating Expense	(4,876,421)	(5,208,479)	(5,489,069)	(5,795,095)	(6,101,297)	(7,564,341)
Total Non-Operating Revenue	39,523	39,918	40,317	40,720	41,128	43,226
Total DS	(594,000)	(933,396)	(933,396)	(933,396)	(1,499,056)	(1,500,056)
Total CIP	(2,339,818)	(7,243,498)	(3,503,661)	(4,250,862)	(11,756,043)	(2,751,470)
Net Income (Loss) Before Transfers	184,691	244,184	64,838	(16,162)	63,058	344,044
Change in Net Position after Transfers and Contributions	131,009	189,965	10,076	(71,471)	7,196	285,332
Beginning Fund Balance	2,895,824	3,026,833	3,216,798	3,226,874	3,155,403	3,889,135
Ending Fund Balance (Unrestricted)	**$3,026,833**	**$3,216,798**	**$3,226,874**	**$3,155,403**	**$3,162,599**	**$4,174,467**
Fund Balance as % of O&M	**62%**	**62%**	**59%**	**54%**	**52%**	**55%**
Days of Working Capital	**223**	**222**	**212**	**196**	**187**	**199**
Coverage Ratio	**5.18**	**4.16**	**4.78**	**5.49**	**3.85**	**5.65**

SECTION II: OVERVIEW OF APPROACH AND ADOPTION OF REVISED RATES

This study analyzes potential rate increase scenarios to meet current and future debt service obligations, while ensuring revenue sufficiency for capital improvements, the funding of depreciation (repair and replacement) and existing bond covenants. The recommendations presented in this study are based on reasonable planning, cost, and demand projections. The proposed rate scenarios are designed to recover the costs necessary to maintain a viable utility, while balancing economic and affordability concerns.

EXISTING RATE STRUCTURE

The existing monthly charge for sewer services consist of a base rate of $9.32 per connection plus a usage charge of $1.42 per 1,000 gallons.

GENERAL RATE OBJECTIVES

Several objectives were identified by the City which served as the foundation of the rate update and scenario analysis.

- First, the City wanted to ensure sufficient revenues to cover all operation and maintenance (O&M) expenses while maintaining bond covenants and the appropriate debt service coverage ratio of at least 1.25x.
- Second, the City wanted to continue to fund capital improvements in the ten-year window using rate revenues, while minimizing future bonding needs and maintaining a fund balance of 50 percent of annual O&M expenses.
- Third, the rates should evaluate a policy to maintain the existing rate structure based on a base rate assessment plus a usage fee, with an adjustment for a base fee per unit, rather than a base fee per connection. This would result in a fee assessment for multi-unit establishments based on the number of dwelling units or "doors". The usage fee would continue to be assessed based on flow, regardless of the number of units.
- Finally, the proposed rate recommendations should be easy to implement and equitably distribute cost relative to daily and peak demand.

RATE DETERMINATION METHODOLOGY

Based on the above objectives, the sewer rate analysis has been divided into the following three phases:

1. **Revenue Growth Analysis:** LYRB studied existing revenue data and growth projections provided by the City. This information was then analyzed to determine the potential allocation of new accounts and the revenue potential within the sewer utility.
2. **Cost of Service Analysis:** The cost of service analysis is structured to balance revenue sufficiency with future operating and maintenance costs, contracts, repair and replacement, capital expenditures, funding for current system deficiencies and bond service coverage ratios. Expenses were projected out to 2026 and revenues were analyzed under a variety of scenarios to meet the City's needs.
3. **Rate Design Analysis:** The final phase focuses on structuring rates that will collect the necessary revenues based on the City's budgetary needs and rate objectives.

SECTION III: REVENUE GROWTH ANALYSIS

SERVICE AREA

The utility rates identified in this document will be assessed to all accounts within the sewer utility service area.

DEMAND UNITS

The demand units in this analysis are connections and projected flows. According to information provided by the City, there were 22,634 system connections in 2015. The City has projected connections based on an annual growth rate of one percent, resulting in a total of 23,789 connections by 2020. This analysis applies the same growth rate through 2026, resulting in a total of 25,252 connections. For the purposes of this analysis, estimated flows are projected at a constant level of 2.5 million units (measured in 1,000 gallon units). Historic flow data shows a declining trend, dropping from 2.66 million units in 2009 to 2.5 million units in 2014 and 2015. Further decline in flows will affect the projected revenue as shown in this report.

TABLE 3.1: CITY-WIDE GROWTH PROJECTIONS

ESUs (FY)	TOTAL CONNECTIONS
2016	22,860
2017	23,089
2018	23,320
2019	23,553
2020	23,789
2021	24,026
2022	24,267
2023	24,509
2024	24,754
2025	25,002
2026	25,252

HISTORIC AND PROJECTED OPERATING REVENUES

Utilizing the growth estimates shown in **Table 3.1**, LYRB forecasted the potential revenues generated from current service charges without any rate increases, as shown below. The City desired to maintain the existing rate structure based on a base rate assessment plus a usage fee. In addition to proposed rate increases, this analysis includes an adjustment for a base fee per unit, rather than a base fee per connection. This would result in a fee assessment for multi-unit establishments based on the number of dwelling units or "doors". The usage fee would continue to be assessed based on flow, regardless of the number of units. The usage fee would continue to be assessed based on flow, regardless of the number of units. The City has estimated that this structural change in the rate assessment would produce an additional $800,000 in revenues per year, which is included in the revenue calculation below.

TABLE 3.2: HISTORIC OPERATING REVENUES

	2009	2010	2011	2012	2013	2014	2015
Charges for Services	5,773,255	5,857,655	6,201,588	6,329,891	6,380,841	6,449,844	6,444,975
Other Revenues	286,980	590,402	395,754	481,875	765,667	1,070,862	1,562,186
Total Operating Revenue	**$6,060,235**	**$6,448,057**	**$6,597,342**	**$6,811,766**	**$7,146,508**	**$7,520,706**	**$8,007,161**

Source: Orem City Financial Statements

TABLE 3.3: FORECASTED OPERATING REVENUES

Scenario 1: 5 Year Phase In	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 10**
Base Rate (per Month)	$9.32	$9.32	$10.72	$12.11	$13.44	$16.03
Usage Charge (per Month)	$1.42	$2.13	$2.45	$2.77	$3.07	$3.66
Total Operating Revenue	$7,955,408	$9,804,902	$11,054,200	$12,308,935	$13,503,638	$16,046,719
Scenario 2: 7 Year Phase In	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 10**
Base Rate (per Month)	$9.32	$9.32	$10.72	$12.33	$13.56	$16.03
Usage Charge (per Month)	$1.42	$1.85	$2.18	$2.53	$2.78	$3.66
Total Operating Revenue	$7,955,408	$9,089,638	$10,364,482	$11,758,654	$12,797,428	$16,046,719
Scenario 3: 10 Year Phase In	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 10**
Base Rate (per Month)	$9.32	$9.32	$10.44	$11.69	$12.86	$16.03
Usage Charge (per Month)	$1.42	$1.85	$2.07	$2.32	$2.55	$3.66
Total Operating Revenue	$7,955,408	$9,089,638	$10,004,348	$11,039,511	$12,008,068	$16,046,719
Scenario 4: Bonding	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 10**
Base Rate (per Month)	$9.32	$9.32	$10.25	$11.28	$12.41	$16.03
Usage Charge (per Month)	$1.42	$1.85	$2.07	$2.32	$2.55	$3.66
Total Operating Revenue	$7,955,408	$9,089,638	$9,950,647	$10,922,471	$11,878,325	$16,046,719

PROJECTED NON-OPERATING REVENUES

Non-operating revenues are primarily comprised of impact fee revenues and interest revenues. The City currently assesses an impact fee within a recently annexed area of the City. However, revenues from these sources are not considered in this analysis at this time due to the uncertainty of the timing of new growth. Historic and projected total non-operating revenues are shown below. Assumptions regarding annual non-operating revenues do not change under each scenario. The projections assume non-operating revenue will grow at an annual rate of one percent.

TABLE 3.4: HISTORIC NON-OPERATING REVENUES

NON-OPERATING REVENUES (EXPENSES)	2009	2010	2011	2012	2013	2014	2015
Interest Revenue	37,435	18,401	22,015	29,202	16,134	21,437	26,318
Impact Fee Revenues	-	-	-	-	-	-	-
Gain (Loss) on Sale of Capital Assets	14,975	13,998	(26,296)	61,034	(55,327)	2,200	76,399
Donations/Grants	-	-	-	-	-	-	-
Deferred Charges	-	(1,371)	(3,655)	(3,655)	(3,655)	-	-
Total Non-Operating Revenue	**$52,410**	**$31,028**	**($7,936)**	**$86,581**	**($42,848)**	**$23,637**	**$102,717**

Source: Orem City Financial Statements

TABLE 3.5: FORECASTED NON-OPERATING REVENUES

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 10
Total Non-Operating Revenues (Expenses)	**$39,523**	**$39,918**	**$40,317**	**$40,720**	**$41,128**	**$43,226**

SECTION IV: COST OF SERVICE ANALYSIS

This analysis considers historic revenues and expenses during the period from Fiscal Year ("FY") 2009 through FY 2015, and forecasts revenues and expenditures through 2026. Projected cash flows for the sewer utility were analyzed to ensure that the City's objectives are met – to ensure revenue sufficiency to cover O&M while maintaining bond covenants and the appropriate debt service coverage ratio; fund all necessary capital improvements; and, provide an appropriate fund balance according to the City's existing budget policies.

COSTS TO BE RECOVERED THROUGH SERVICE CHARGES

OPERATIONS AND MAINTENANCE

General O&M expenses are incurred through the normal day-to-day operations of the sewer system. These expenses can include costs such as wages and salaries, benefits, utility costs and supplies. These costs are considered fixed as the system does not deal with fluctuation in water flows like a culinary or secondary water system. Projections of the future O&M expenses, excluding the Administrative Fee, are projected to grow at an annual rate of three percent. Historic data shows an average annual growth of less than one percent growth in expenditures from 2009 to 2015. A comparison to the Municipal Cost Index (MCI) and Construction Cost Index (CCI) shows an average annual change in cost components of 2.8 percent and 3.2 percent respectively.[1] Thus, a three percent increase in operations and maintenance expenses appears reasonable for the purposes of forecasting expenses. According to the City, Administrative Expense is set to ten percent of new revenue plus previous year's total. Therefore, O&M expense is adjusted based on the calculated revenues for each scenario, resulting in a differing O&M forecast, until year ten when this is equalized.

TABLE 4.1: HISTORIC OPERATIONS AND MAINTENANCE EXPENSES

OPERATING EXPENSE	2009	2010	2011	2012	2013	2014	2015
Personal Services	(2,122,801)	(2,055,743)	(2,000,516)	(2,105,684)	(2,028,481)	(1,960,862)	(1,830,390)
Supplies and Maintenance	(567,557)	(557,625)	(597,838)	(636,648)	(713,955)	(793,880)	(714,679)
Administrative Fee*	(804,769)	(841,076)	(862,102)	(854,576)	(884,441)	(857,804)	(648,162)
Utilities	(454,329)	(524,360)	(533,260)	(584,089)	(634,577)	(624,227)	(649,009)
Contract Services	(787,473)	(706,697)	(642,914)	(743,387)	(507,136)	(524,055)	(576,514)
Equipment Lease and Rentals	(826)	(2,546)	(3,975)	(12,060)	(18,402)	(15,600)	(11,996)
Insurance	(67,952)	(68,313)	(68,201)	(102,003)	(102,627)	(112,682)	(112,738)
Changes in Lieu of Property Tax	(95,000)	(97,500)	(100,000)	(52,500)	(50,000)	(50,000)	(52,665)
Miscellaneous	(64,288)	(52,129)	(63,359)	(70,895)	(75,217)	(77,273)	(104,167)
Total Operating Expense	**($4,964,995)**	**($4,905,989)**	**($4,872,165)**	**($5,161,842)**	**($5,014,836)**	**($5,016,383)**	**($4,700,320)**

Source: City of Orem Financial Statements. *According to the City, Administrative Expense set to ten percent of new revenue plus previous year's total.

TABLE 4.2: PROJECTED OPERATIONS AND MAINTENANCE EXPENSES

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 10
Scenario 1: Total Operating Expense	(4,876,421)	(5,351,532)	(5,709,780)	(6,072,388)	(6,426,359)	(7,564,341)
Scenario 2: Total Operating Expense	(4,876,421)	(5,208,479)	(5,571,837)	(5,962,332)	(6,285,117)	(7,564,341)
Scenario 3: Total Operating Expense	(4,876,421)	(5,208,479)	(5,499,810)	(5,818,503)	(6,127,245)	(7,564,341)
Scenario 4: Total Operating Expense	($4,876,421)	($5,208,479)	($5,489,069)	($5,795,095)	($6,101,297)	($7,564,341)

CAPITAL PROJECT COSTS

Capital projects must be constructed to update and expand the sewer system. Capital project costs may be paid through cash reserves, impact fees or debt financing. If the City is able to accumulate sufficient cash reserves and chooses to use these reserves to fund capital projects, the need for debt financing may be mitigated. In this analysis, several projects are identified that must be constructed through 2026 and beyond. **Table 4.3** summarizes the total proposed capital improvement estimated construction costs. The City's Master Plan provides a detail of the proposed capital improvement plan (CIP). The sum of capital costs for the 10 year period fluctuate for each scenario due to construction timing. Scenario 4, which includes bonding, allows for projects to be built earlier, reducing the amount of inflation that is accumulated over time. As is shown in the five year totals, Scenario 4 funds a larger portion of the CIP within the 5 year window.

[1] Source: http://americancityandcounty.com/mciarchive/#Archive, Accessed January 2016. Based on average from 2000-2015.

TABLE 4.3: SUMMARY OF CAPITAL PROJECT COSTS

	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	5 YEAR TOTAL
Scenario 1: 5 Year Phase In	2,340,665	3,808,706	4,748,215	5,574,372	6,435,555	**$22,907,513**
Scenario 2: 7 Year Phase In	2,339,818	3,282,893	4,170,292	5,053,328	5,831,885	**$20,678,216**
Scenario 3: 10 Year Phase In	2,339,818	3,082,893	3,870,292	4,653,328	5,231,885	**$19,178,216**
Scenario 4: Bonding	2,339,818	7,243,498	3,503,661	4,250,862	11,756,043	**$29,093,882**
	Year 6	**Year 7**	**Year 8**	**Year 9**	**Year 10**	**10 Year Total**
Scenario 1: 5 Year Phase In	6,656,442	6,884,902	7,121,196	7,365,592	7,586,560	**58,522,205**
Scenario 2: 7 Year Phase In	6,357,901	6,884,902	7,121,196	7,365,592	7,586,560	**55,994,367**
Scenario 3: 10 Year Phase In	5,757,901	6,271,586	6,702,834	7,139,571	7,586,560	**52,636,668**
Scenario 4: Bonding	$4,774,233	$5,304,597	$5,756,898	$6,213,169	$6,681,504	**$57,824,284**

FUNDING OF DEPRECIATION (REPAIR & REPLACEMENT)

Funding depreciation in the proposed rate structure, or adopting a formal repair and replacement plan, will reduce the City's need to issue future debt, and will therefore decrease future interest expense and help the City avoid abrupt rate increases to fund unforeseen expenses. The City's CIP includes both growth related projects and repair/replacement projects. Thus, an additional allocation in the CIP for depreciation is not included in this analysis.

DEBT SERVICE COSTS

The City has funded its existing capital infrastructure through a combination of different revenue sources, including rate revenues and the issuance of debt. There is one piece of outstanding debt applicable to this analysis: the 2010 Water Quality Revenue Bonds, of which 100 percent is related to sewer. The proceeds of the bonds were used to construct and expand facilities at the Sewer Plant.

TABLE 4.4: OUTSTANDING DEBT

DEBT SERVICE	2009	2010	2011	2012	2013	2014	2015	2016	2017
2010	-	-	-	-	($594,000)	($594,000)	($594,000)	($594,000)	($594,000)
Debt Service	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**
2010	($594,000)	($594,000)	($594,000)	($594,000)	($594,000)	($594,000)	($595,000)	($595,000)	($595,000)

Scenario 4 assumes the City will issue additional bonds in the planning horizon to fund future capital needs. It is anticipated that two pieces of debt would be required to mitigate annual rate increases while funding the proposed CIP. The following debt assumptions are used for Scenario 4.

TABLE 4.5: DEBT ASSUMPTIONS

	Series 2018	Series 2021
Proceeds	$4,500,000	$7,500,000
COI	2.50%	2.50%
Coupon	4.00%	4.00%

The proposed bonds are based on level debt over 20 years. The proposed Series 2018 would mature in 2037 and the proposed Series 2021 would mature in 2040.

TABLE 4.6: FORECAST OF FUTURE DEBT SERVICE PAYMENTS

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
2010	(594,000)	(594,000)	(594,000)	(594,000)	(594,000)	(594,000)	(594,000)	(595,000)	(595,000)	(595,000)
Proposed: Series 2018	-	(339,396)	(339,396)	(339,396)	(339,396)	(339,396)	(339,396)	(339,396)	(339,396)	(339,396)
Proposed: Series 2021	-	-	-	-	(565,660)	(565,660)	(565,660)	(565,660)	(565,660)	(565,660)
Total DS	**($594,000)**	**($933,396)**	**($933,396)**	**($933,396)**	**($1,499,056)**	**($1,499,056)**	**($1,499,056)**	**($1,500,056)**	**($1,500,056)**	**($1,500,056)**

SECTION V: RATE DESIGN ANALYSIS

PROPOSED RATE STRUCTURE SCENARIOS

The primary objectives of the rate analysis was to ensure sufficient revenues to cover all operation and maintenance (O&M) expenses while maintaining bond covenants and the appropriate debt service coverage ratio. The City also wanted to ensure the recommended rates allowed for appropriate funding of capital improvements in the five-year window.

A review of projected revenues under the existing rate structure relative to proposed expenses illustrated that the City would not have sufficient revenues to fund the needed capital improvements without a rate increase. As a result, City staff, the City Council and consultants evaluated many potential rate scenarios during the study phase of this analysis, with the City ultimately focusing on four scenarios:

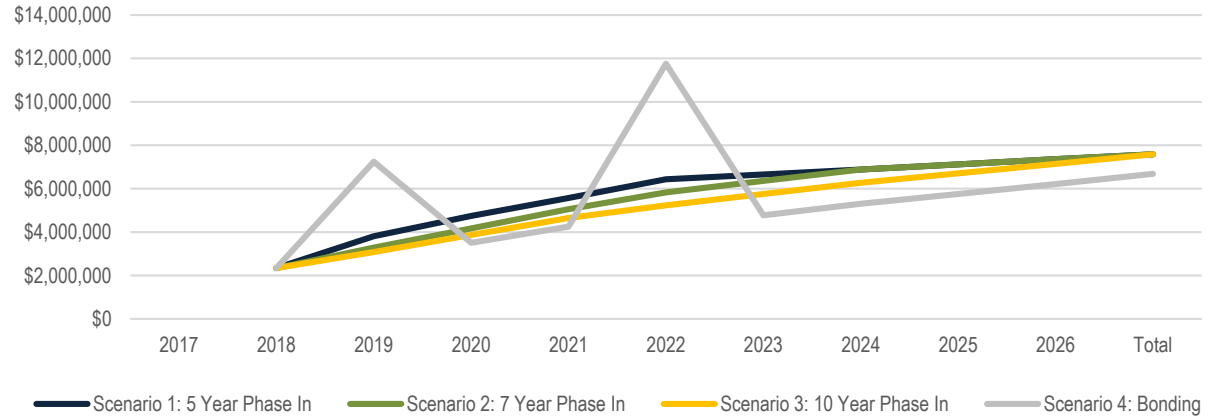
- **Scenario 1** – Phasing the proposed CIP over a five (5) year period with no new debt;
- **Scenario 2** – Phasing the proposed CIP over a seven (7) year period with no new debt;
- **Scenario 3** – Phasing the proposed CIP over a ten (10) year period with no new debt; and,
- **Scenario 4** – Phasing the proposed CIP over a five (5) year period with new debt.

The rate scenarios shown below are structured to produce a final base rate of $16.03 within ten years and a usage rate of $3.66 per 1,000 gallons. The annual rate increase curve for each scenario is adjusted to reflect the changes in the CIP (See **Figure 5.1**), with Scenarios 2-4 funding a reduced CIP in order to allow for a more moderate annual increase in the rates.

TABLE 5.1: ILLUSTRATION OF PROPOSED RATE INCREASE SCENARIOS

	Scenario 1: 5 Year Phase In		Scenario 2: 7 Year Phase In		Scenario 3: 10 Year Phase In		Scenario 4: Bonding	
	Base (per month)	Usage Charge (per 1K gal)	Base (per month)	Usage Charge (per 1K gal)	Usage Charge (per 1K gal)	Usage Charge (per 1K gal)	Base (per month)	Usage Charge (per 1K gal)
2016	**$9.32**	**$1.42**	**$9.32**	**$1.42**	**$9.32**	**$1.42**	**$9.32**	**$1.42**
2017	$9.32	$1.42	$9.32	$1.42	$9.32	$1.42	$9.32	$1.42
2018	$9.32	$2.13	$9.32	$1.85	$9.32	$1.85	$9.32	$1.85
2019	$10.72	$2.45	$10.72	$2.18	$10.44	$2.07	$10.25	$2.07
2020	$12.11	$2.77	$12.33	$2.53	$11.69	$2.32	$11.28	$2.32
2021	$13.44	$3.07	$13.56	$2.78	$12.86	$2.55	$12.41	$2.55
2022	$14.11	$3.22	$14.37	$3.00	$13.89	$2.75	$13.40	$2.75
2023	$14.67	$3.35	$14.94	$3.24	$14.72	$2.97	$14.34	$2.97
2024	$15.11	$3.45	$15.39	$3.40	$15.31	$3.21	$15.06	$3.21
2025	$15.56	$3.55	$15.77	$3.57	$15.72	$3.47	$15.59	$3.47
2026	**$16.03**	**$3.66**	**$16.03**	**$3.66**	**$16.03**	**$3.66**	**$16.03**	**$3.66**
10-YR CIP		**$58,522,205**		**$55,994,367**		**$52,636,668**		**$57,824,284**
Fund Balance (Year 10)		**$4,428,295**		**$4,332,297**		**$4,345,164**		**$4,174,467**

FIGURE 5.1: PROPOSED CIP FUNDING



Each scenario assumes an annual growth of one percent in connections. Annual Operation and Maintenance ("O&M") expenditures are assumed to increase by three percent annually. The comparison of revenues and expenditures under the proposed rate increases illustrates that the City will continue to maintain the necessary debt service coverage ratios, while providing necessary funding for capital improvement and replacement projects according to the proposed CIP scenarios. While the fund balance is anticipated to increase slightly over time under each scenario, the proportional "Days of Working Capital" will decline as a result of increasing operations and maintenance expenditures. However, the fund balances will achieve the minimum set by the City of maintaining at least 50 percent of O&M expenses in reserve funds by Year 10.

TABLE 5.2: SUMMARY PRO FORMA – SCENARIO 1

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 10
Base Rate (per Month)	**$9.32**	**$9.32**	**$10.72**	**$12.11**	**$13.44**	**$16.03**
Usage Charge (per Month)	**$1.42**	**$2.13**	**$2.45**	**$2.77**	**$3.07**	**$3.66**
Calculated Connections	23,089	23,320	23,553	23,789	24,026	25,252
Total Operating Revenue	7,955,408	9,804,902	11,054,200	12,308,935	13,503,638	16,046,719
Total Operating Expense	(4,876,421)	(5,351,532)	(5,709,780)	(6,072,388)	(6,426,359)	(7,564,341)
Total Non-Operating Revenue	39,523	39,918	40,317	40,720	41,128	43,226
Total DS	(594,000)	(594,000)	(594,000)	(594,000)	(594,000)	(595,000)
Total CIP	(2,340,665)	(3,808,706)	(4,748,215)	(5,574,372)	(6,435,555)	(2,751,470)
Net Income (Loss) Before Transfers	183,845	90,582	42,522	108,896	88,851	344,044
Change in Net Position after Transfers and Contributions	130,162	36,363	(12,239)	53,587	32,989	285,332
Beginning Fund Balance	2,895,824	3,025,986	3,062,350	3,050,111	3,103,698	4,142,963
Ending Fund Balance (Unrestricted)	**$3,025,986**	**$3,062,350**	**$3,050,111**	**$3,103,698**	**$3,136,687**	**$4,428,295**
Fund Balance as % of O&M	**62%**	**57%**	**53%**	**51%**	**49%**	**59%**
Days of Working Capital	**223**	**206**	**192**	**184**	**176**	**211**
Coverage Ratio	**5.18**	**7.50**	**9.00**	**10.50**	**11.91**	**14.26**

TABLE 5.3: SUMMARY PRO FORMA – SCENARIO 2

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 10
Base Rate (per Month)	**$9.32**	**$9.32**	**$10.72**	**$12.33**	**$13.56**	**$16.03**
Usage Charge (per Month)	**$1.42**	**$1.85**	**$2.18**	**$2.53**	**$2.78**	**$3.66**
Calculated Connections	23,089	23,320	23,553	23,789	24,026	25,252
Total Operating Revenue	7,955,408	9,089,638	10,364,482	11,758,654	12,797,428	16,046,719
Total Operating Expense	(4,876,421)	(5,208,479)	(5,571,837)	(5,962,332)	(6,285,117)	(7,564,341)
Total Non-Operating Revenue	39,523	39,918	40,317	40,720	41,128	43,226
Total DS	(594,000)	(594,000)	(594,000)	(594,000)	(594,000)	(595,000)
Total CIP	(2,339,818)	(3,282,893)	(4,170,292)	(5,053,328)	(5,831,885)	(2,751,470)
Net Income (Loss) Before Transfers	184,691	44,184	68,671	189,715	127,554	344,044
Change in Net Position after Transfers and Contributions	131,009	(10,035)	13,909	134,406	71,692	285,332
Beginning Fund Balance	2,895,824	3,026,833	3,016,798	3,030,707	3,165,113	4,046,965
Ending Fund Balance (Unrestricted)	**$3,026,833**	**$3,016,798**	**$3,030,707**	**$3,165,113**	**$3,236,805**	**$4,332,297**
Fund Balance as % of O&M	**62%**	**58%**	**54%**	**53%**	**51%**	**57%**
Days of Working Capital	**223**	**209**	**196**	**191**	**185**	**206**
Coverage Ratio	**5.18**	**6.53**	**8.07**	**9.76**	**10.96**	**14.26**

TABLE 5.4: SUMMARY PRO FORMA – SCENARIO 3

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 10
Base Rate (per Month)	**$9.32**	**$9.32**	**$10.44**	**$11.69**	**$12.86**	**$16.03**
Usage Charge (per Month)	**$1.42**	**$1.85**	**$2.07**	**$2.32**	**$2.55**	**$3.66**
Calculated Connections	23,089	23,320	23,553	23,789	24,026	25,252
Total Operating Revenue	7,955,408	9,089,638	10,004,348	11,039,511	12,008,068	16,046,719
Total Operating Expense	(4,876,421)	(5,208,479)	(5,499,810)	(5,818,503)	(6,127,245)	(7,564,341)
Total Non-Operating Revenue	39,523	39,918	40,317	40,720	41,128	43,226
Total DS	(594,000)	(594,000)	(594,000)	(594,000)	(594,000)	(595,000)
Total CIP	(2,339,818)	(3,082,893)	(3,870,292)	(4,653,328)	(5,231,885)	(2,751,470)
Net Income (Loss) Before Transfers	184,691	244,184	80,563	14,400	96,066	344,044
Change in Net Position after Transfers and Contributions	131,009	189,965	25,802	(40,909)	40,204	285,332
Beginning Fund Balance	2,895,824	3,026,833	3,216,798	3,242,599	3,201,691	4,059,832
Ending Fund Balance (Unrestricted)	**$3,026,833**	**$3,216,798**	**$3,242,599**	**$3,201,691**	**$3,241,894**	**$4,345,164**
Fund Balance as % of O&M	**62%**	**62%**	**59%**	**55%**	**53%**	**57%**
Days of Working Capital	**223**	**222**	**212**	**198**	**190**	**207**
Coverage Ratio	**5.18**	**6.53**	**7.58**	**8.79**	**9.90**	**14.26**

TABLE 5.5: SUMMARY PRO FORMA – SCENARIO 4

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 10
Base Rate (per Month)	**$9.32**	**$9.32**	**$10.25**	**$11.28**	**$12.41**	**$16.03**
Usage Charge (per Month)	**$1.42**	**$1.85**	**$2.07**	**$2.32**	**$2.55**	**$3.66**
Calculated Connections	23,089	23,320	23,553	23,789	24,026	25,252
Total Operating Revenue	7,955,408	9,089,638	9,950,647	10,922,471	11,878,325	16,046,719
Total Operating Expense	(4,876,421)	(5,208,479)	(5,489,069)	(5,795,095)	(6,101,297)	(7,564,341)
Total Non-Operating Revenue	39,523	39,918	40,317	40,720	41,128	43,226
Total DS	(594,000)	(933,396)	(933,396)	(933,396)	(1,499,056)	(1,500,056)
Total CIP	(2,339,818)	(7,243,498)	(3,503,661)	(4,250,862)	(11,756,043)	(2,751,470)
Net Income (Loss) Before Transfers	184,691	244,184	64,838	(16,162)	63,058	344,044
Change in Net Position after Transfers and Contributions	131,009	189,965	10,076	(71,471)	7,196	285,332
Beginning Fund Balance	2,895,824	3,026,833	3,216,798	3,226,874	3,155,403	3,889,135
Ending Fund Balance (Unrestricted)	**$3,026,833**	**$3,216,798**	**$3,226,874**	**$3,155,403**	**$3,162,599**	**$4,174,467**
Fund Balance as % of O&M	**62%**	**62%**	**59%**	**54%**	**52%**	**55%**
Days of Working Capital	**223**	**222**	**212**	**196**	**187**	**199**
Coverage Ratio	**5.18**	**4.16**	**4.78**	**5.49**	**3.85**	**5.65**

SECTION VI: EVALUATION OF RATE OBJECTIVES

Several objectives were identified by the City which served as the foundation of the rate update and scenario analysis.

- First, the City wanted to ensure sufficient revenues to cover all operation and maintenance (O&M) expenses while maintaining bond covenants and the appropriate debt service coverage ratio of at least 1.25x.
- Second, the City wanted to continue to fund capital improvements in the ten-year window using rate revenues, while minimizing future bonding needs and maintaining a fund balance of 50 percent of annual O&M expenses.
- Third, the rates should evaluate a policy to maintain the existing rate structure based on a base rate assessment plus a usage fee, with an adjustment for a base fee per unit, rather than a base fee per connection. This would result in a fee assessment for multi-unit establishments based on the number of dwelling units or "doors". The usage fee would continue to be assessed based on flow, regardless of the number of units.
- Finally, the proposed rate recommendations should be easy to implement and equitably distribute cost relative to demand.

EVALUATION OF EFFECTIVENESS OF RATE OBJECTIVES

Revenue Sufficiency: The comparison of revenues and expenditures under the proposed rate increases illustrates that the City will continue to maintain the necessary debt service coverage ratios, while providing necessary funding for capital improvement and replacement projects according to the proposed CIP scenarios. While the fund balance is anticipated to increase slightly over time under each scenario, the proportional "Days of Working Capital" will decline as a result of increasing operations and maintenance expenditures. However, the fund balances will achieve the minimum set by the City of maintaining at least 50 percent of O&M expenses in reserve funds by Year 10.

Funding Capital Costs and Maintaining Revenue Sufficiency: The rate analysis considers necessary increases to adequately fund the repair and replacement of existing facilities, future capital costs and to maintain a fund balance at the end of each year utilizing a pay-as-you go approach.

Rate Structure: The adopted rate maintains the existing rate structure with a fee assessment per unit or door.

Equity and Simplicity: The adopted rates are simple to understand and the calculation follows a reasonable methodology by which the rates are assessed. Currently, rates are assessed base fee per connection plus a usage fee. This is intended to assess a fee that is directly related to demand, i.e. wastewater flows. In order to more equitably distribute the base fee assessment, this analysis included an adjustment for a base fee per unit, rather than a base fee per connection. This would result in a fee assessment for multi-unit establishments based on the number of dwelling units or "doors" to more accurately account for the number of residential units. The usage fee would continue to be assessed based on flow, regardless of the number of units.

CUSTOMER IMPACT AND AFFORDABILITY

The City must collect, through monthly rates, the costs of running efficient and effective utilities while making certain that the rates are affordable to the customers to whom the service is provided. The maximum proposed rates by year ten register at 2.23 percent of current median household incomes (MHI), including proposed changes to the water utility rates. An affordability index of 1.6 - 2.6 percent of MHI is used as a benchmark in this analysis, which is the affordability index for a combined annual water and sewer bill for an AA to an A rated sewer or water utility bond. The proposed rates fall within this affordability threshold.[2] It is important to note that the table below includes the full increase to the sewer and water rates at the end of the pro forma (Fiscal Year 2026) compared to the unadjusted 2015 MHI. Thus, this illustration represents a conservative estimate of affordability.

TABLE 6.1: AFFORDABILITY OF ADOPTED RATES AT END OF TEN YEAR PERIOD

Orem 2015 Median Household Income	$54,048
Estimate of Annual Sewer Bill	$544
Estimate of Annual Water Bill	$663
Total Combined Water & Sewer Annual Bill	**$1,207**
% of MHI	2.23%

Source: U.S. Census Bureau 2008-2012 ACS Survey 5-Year Estimates, Selected Economic Characteristics
Estimate of annual bill based on typical single-family dwelling.

[2] See "2015 Water and Sewer Medians", December 10, 2014, Fitch Ratings.

APPENDIX A: DETAILED PRO FORMAS

Orem City

Utility Rate Study
Sanitary Sewer
Scenario 1: 5 Year CIP No Bond

			Year 1	Year 2	Year 3	Year 4	Year 5					
			0.5%	27.7%	14.6%	12.8%	10.8%	5.1%	4.2%	3.3%	3.2%	3.3%
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Charges for Services	$6,444,975	$6,619,986	$6,650,408	$8,494,852	$9,739,050	$10,988,633	$12,178,133	$12,800,347	$13,343,477	$13,778,100	$14,218,840	$14,694,408
Estimated Increase from Door to Door Revs			$800,000	$800,000	$800,000	$800,000	$800,000	$800,000	$800,000	$800,000	$800,000	$800,000
Other Revenues (Including Connection Fees)	$1,562,186	$500,000	$505,000	$510,050	$515,151	$520,302	$525,505	$530,760	$536,068	$541,428	$546,843	$552,311
Total Operating Revenue	$8,007,161	$7,119,986	$7,955,408	$9,804,902	$11,054,200	$12,308,935	$13,503,638	$14,131,107	$14,679,544	$15,119,528	$15,565,683	$16,046,719
Operating Expense												
Personal Services	($1,830,390)	($1,885,302)	($1,941,861)	($2,000,117)	($2,060,120)	($2,121,924)	($2,185,581)	($2,251,149)	($2,318,683)	($2,388,244)	($2,459,891)	($2,533,688)
Supplies and Maintenance	($714,679)	($736,119)	($665,041)	($849,485)	($973,905)	($1,098,863)	($1,217,813)	($1,280,035)	($1,334,348)	($1,377,810)	($1,421,884)	($1,469,441)
Administrative Fee	($648,162)	($667,607)	($670,649)	($855,093)	($979,513)	($1,104,472)	($1,223,422)	($1,285,643)	($1,339,956)	($1,383,418)	($1,427,492)	($1,475,049)
Utilities	($649,009)	($668,479)	($688,534)	($709,190)	($730,465)	($752,379)	($774,951)	($798,199)	($822,145)	($846,810)	($872,214)	($898,380)
Contract Services	($576,514)	($593,809)	($611,624)	($629,972)	($648,872)	($668,338)	($688,388)	($709,040)	($730,311)	($752,220)	($774,787)	($798,030)
Equipment Lease and Rentals	($11,996)	($12,356)	($12,727)	($13,108)	($13,502)	($13,907)	($14,324)	($14,754)	($15,196)	($15,652)	($16,122)	($16,605)
Insurance	($112,738)	($116,120)	($119,604)	($123,192)	($126,888)	($130,694)	($134,615)	($138,654)	($142,813)	($147,098)	($151,510)	($156,056)
Changes in Lieu of Property Tax	($52,665)	($54,245)	($55,872)	($57,548)	($59,275)	($61,053)	($62,885)	($64,771)	($66,714)	($68,716)	($70,777)	($72,901)
Miscellaneous	($104,167)	($107,292)	($110,511)	($113,826)	($117,241)	($120,758)	($124,381)	($128,112)	($131,956)	($135,914)	($139,992)	($144,191)
Total Operating Expense	($4,700,320)	($4,841,330)	($4,876,421)	($5,351,532)	($5,709,780)	($6,072,388)	($6,426,359)	($6,670,356)	($6,902,122)	($7,115,881)	($7,334,669)	($7,564,341)
Net Operating Income (Loss)	$3,306,841	$2,278,657	$3,078,986	$4,453,370	$5,344,420	$6,236,548	$7,077,279	$7,460,751	$7,777,422	$8,003,647	$8,231,014	$8,482,378
Total Non Operating Revenue	$102,717	$39,132	$39,523	$39,918	$40,317	$40,720	$41,128	$41,539	$41,954	$42,374	$42,798	$43,226
Total Revenue Available for DS	$3,409,558	$2,317,788	$3,118,509	$4,493,288	$5,384,737	$6,277,268	$7,118,407	$7,502,290	$7,819,377	$8,046,021	$8,273,811	$8,525,603
Debt Service												
1994	($246,330)	-	-	-	-	-	-	-	-	-	-	-
2005A	-	-	-	-	-	-	-	-	-	-	-	-
2005B	-	-	-	-	-	-	-	-	-	-	-	-
2008	-	-	-	-	-	-	-	-	-	-	-	-
2010	($594,000)	($594,000)	($594,000)	($594,000)	($594,000)	($594,000)	($594,000)	($594,000)	($594,000)	($595,000)	($595,000)	($595,000)
2013 Refunding of 2005A	-	-	-	-	-	-	-	-	-	-	-	-
Proposed: Series 2018		-	-	-	-	-	-	-	-	-	-	-
Proposed: Series 2021		-	-	-	-	-	-	-	-	-	-	-
Total DS	($840,330)	($594,000)	($594,000)	($594,000)	($594,000)	($594,000)	($594,000)	($594,000)	($594,000)	($595,000)	($595,000)	($595,000)
Total Revenue Available for CIP	$2,569,228	$1,723,788	$2,524,509	$3,899,288	$4,790,737	$5,683,268	$6,524,407	$6,908,290	$7,225,377	$7,451,021	$7,678,811	$7,930,603
Total CIP	-		($2,340,665)	($3,808,706)	($4,748,215)	($5,574,372)	($6,435,555)	($6,656,442)	($6,884,902)	($7,121,196)	($7,365,592)	($7,586,560)
Proposed: Series 2018 Proceeds		-	-	-	-	-	-	-	-	-	-	-
Proposed: Series 2021 Proceeds		-	-	-	-	-	-	-	-	-	-	-
Total Bond Proceeds		-	-	-	-	-	-	-	-	-	-	-
Net Income (Loss) Before Transfers	$2,569,228	$1,723,788	$183,845	$90,582	$42,522	$108,896	$88,851	$251,848	$340,474	$329,824	$313,220	$344,044
Contributions from Outside Sources	$112,960	$88,692	$89,579	$90,475	$91,380	$92,294	$93,217	$94,149	$95,090	$96,041	$97,002	$97,972
Contributions from Government Funds		-	-	-	-	-	-					
Transfers In		-	-	-	-	-	-	-	-	-	-	-
Transfers Out	($190,205)	($141,843)	($143,262)	($144,694)	($146,141)	($147,603)	($149,079)	($150,569)	($152,075)	($153,596)	($155,132)	($156,683)
Change in Net Position	$2,491,983		$130,162	$36,363	($12,239)	$53,587	$32,989	$195,428	$283,489	$272,270	$255,089	$285,332
Beginning Cash Balance			$2,895,824	$3,025,986	$3,062,350	$3,050,111	$3,103,698	$3,136,687	$3,332,114	$3,615,604	$3,887,873	$4,142,963
Ending Fund Balance			$3,025,986	$3,062,350	$3,050,111	$3,103,698	$3,136,687	$3,332,114	$3,615,604	$3,887,873	$4,142,963	$4,428,295
General Fund Restricted (Bond Proceeds)		-	-	-	-	-	-	-	-	-	-	-
Unrestricted		$2,895,824	$3,025,986	$3,062,350	$3,050,111	$3,103,698	$3,136,687	$3,332,114	$3,615,604	$3,887,873	$4,142,963	$4,428,295
Unrestricted Days of Working Capital	-	215	223	206	192	184	176	180	189	197	203	211
Coverage Ratio (w/Impact Fees)			5.18	7.50	9.00	10.50	11.91	12.56	13.09	13.45	13.83	14.26
Coverage Ratio (w/o Impact Fees)			5.18	7.50	9.00	10.50	11.91	12.56	13.09	13.45	13.83	14.26

Orem City

Utility Rate Study
Sanitary Sewer
Scenario 2: 7 Year CIP No Bond

			Year 1	Year 2	Year 3	Year 4	Year 5					
			0.5%	17.0%	16.3%	15.3%	9.9%	7.3%	6.7%	4.5%	4.4%	2.5%
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Charges for Services	$6,444,975	$6,619,986	$6,650,408	$7,779,588	$9,049,332	$10,438,352	$11,471,923	$12,314,066	$13,141,891	$13,733,549	$14,332,935	$14,694,408
Estimated Increase from Door to Door Revs			$800,000	$800,000	$800,000	$800,000	$800,000	$800,000	$800,000	$800,000	$800,000	$800,000
Other Revenues (Including Connection Fees)	$1,562,186	$500,000	$505,000	$510,050	$515,151	$520,302	$525,505	$530,760	$536,068	$541,428	$546,843	$552,311
Total Operating Revenue	$8,007,161	$7,119,986	$7,955,408	$9,089,638	$10,364,482	$11,758,654	$12,797,428	$13,644,827	$14,477,958	$15,074,977	$15,679,778	$16,046,719
Operating Expense												
Personal Services	($1,830,390)	($1,885,302)	($1,941,861)	($2,000,117)	($2,060,120)	($2,121,924)	($2,185,581)	($2,251,149)	($2,318,683)	($2,388,244)	($2,459,891)	($2,533,688)
Supplies and Maintenance	($714,679)	($736,119)	($665,041)	($777,959)	($904,933)	($1,043,835)	($1,147,192)	($1,231,407)	($1,314,189)	($1,373,355)	($1,433,294)	($1,469,441)
Administrative Fee	($648,162)	($667,607)	($670,649)	($783,567)	($910,541)	($1,049,443)	($1,152,801)	($1,237,015)	($1,319,797)	($1,378,963)	($1,438,902)	($1,475,049)
Utilities	($649,009)	($668,479)	($688,534)	($709,190)	($730,465)	($752,379)	($774,951)	($798,199)	($822,145)	($846,810)	($872,214)	($898,380)
Contract Services	($576,514)	($593,809)	($611,624)	($629,972)	($648,872)	($668,338)	($688,388)	($709,040)	($730,311)	($752,220)	($774,787)	($798,030)
Equipment Lease and Rentals	($11,996)	($12,356)	($12,727)	($13,108)	($13,502)	($13,907)	($14,324)	($14,754)	($15,196)	($15,652)	($16,122)	($16,605)
Insurance	($112,738)	($116,120)	($119,604)	($123,192)	($126,888)	($130,694)	($134,615)	($138,654)	($142,813)	($147,098)	($151,510)	($156,056)
Changes in Lieu of Property Tax	($52,665)	($54,245)	($55,872)	($57,548)	($59,275)	($61,053)	($62,885)	($64,771)	($66,714)	($68,716)	($70,777)	($72,901)
Miscellaneous	($104,167)	($107,292)	($110,511)	($113,826)	($117,241)	($120,758)	($124,381)	($128,112)	($131,956)	($135,914)	($139,992)	($144,191)
Total Operating Expense	($4,700,320)	($4,841,330)	($4,876,421)	($5,208,479)	($5,571,837)	($5,962,332)	($6,285,117)	($6,573,100)	($6,861,805)	($7,106,971)	($7,357,488)	($7,564,341)
Net Operating Income (Loss)	$3,306,841	$2,278,657	$3,078,986	$3,881,159	$4,792,645	$5,796,323	$6,512,311	$7,071,727	$7,616,153	$7,968,006	$8,322,290	$8,482,378
Total Non Operating Revenue	$102,717	$39,132	$39,523	$39,918	$40,317	$40,720	$41,128	$41,539	$41,954	$42,374	$42,798	$43,226
Total Revenue Available for DS	$3,409,558	$2,317,788	$3,118,509	$3,921,077	$4,832,963	$5,837,043	$6,553,438	$7,113,266	$7,658,108	$8,010,380	$8,365,088	$8,525,603
Debt Service												
1994	($246,330)	-	-	-	-	-	-	-	-	-	-	-
2005A	-	-	-	-	-	-	-	-	-	-	-	-
2005B	-	-	-	-	-	-	-	-	-	-	-	-
2008	-	-	-	-	-	-	-	-	-	-	-	-
2010	($594,000)	($594,000)	($594,000)	($594,000)	($594,000)	($594,000)	($594,000)	($594,000)	($594,000)	($595,000)	($595,000)	($595,000)
2013 Refunding of 2005A	-	-	-	-	-	-	-	-	-	-	-	-
Proposed: Series 2018		-	-	-	-	-	-	-	-	-	-	-
Proposed: Series 2021		-	-	-	-	-	-	-	-	-	-	-
Total DS	($840,330)	($594,000)	($594,000)	($594,000)	($594,000)	($594,000)	($594,000)	($594,000)	($594,000)	($595,000)	($595,000)	($595,000)
Total Revenue Available for CIP	$2,569,228	$1,723,788	$2,524,509	$3,327,077	$4,238,963	$5,243,043	$5,959,438	$6,519,266	$7,064,108	$7,415,380	$7,770,088	$7,930,603
Total CIP	-		($2,339,818)	($3,282,893)	($4,170,292)	($5,053,328)	($5,831,885)	($6,357,901)	($6,884,902)	($7,121,196)	($7,365,592)	($7,586,560)
Proposed: Series 2018 Proceeds		-	-	-	-	-	-	-	-	-	-	-
Proposed: Series 2021 Proceeds		-	-	-	-	-	-	-	-	-	-	-
Total Bond Proceeds		-	-	-	-	-	-	-	-	-	-	-
Net Income (Loss) Before Transfers	$2,569,228	$1,723,788	$184,691	$44,184	$68,671	$189,715	$127,554	$161,365	$179,205	$294,184	$404,496	$344,044
Contributions from Outside Sources	$112,960	$88,692	$89,579	$90,475	$91,380	$92,294	$93,217	$94,149	$95,090	$96,041	$97,002	$97,972
Contributions from Government Funds		-	-	-	-	-	-					
Transfers In		-	-	-	-	-	-	-	-	-	-	-
Transfers Out	($190,205)	($141,843)	($143,262)	($144,694)	($146,141)	($147,603)	($149,079)	($150,569)	($152,075)	($153,596)	($155,132)	($156,683)
Change in Net Position	$2,491,983		$131,009	($10,035)	$13,909	$134,406	$71,692	$104,945	$122,220	$236,629	$346,366	$285,332
Beginning Cash Balance			$2,895,824	$3,026,833	$3,016,798	$3,030,707	$3,165,113	$3,236,805	$3,341,749	$3,463,970	$3,700,599	$4,046,965
Ending Fund Balance			$3,026,833	$3,016,798	$3,030,707	$3,165,113	$3,236,805	$3,341,749	$3,463,970	$3,700,599	$4,046,965	$4,332,297
General Fund Restricted (Bond Proceeds)		-	-	-	-	-	-	-	-	-	-	-
Unrestricted		$2,895,824	$3,026,833	$3,016,798	$3,030,707	$3,165,113	$3,236,805	$3,341,749	$3,463,970	$3,700,599	$4,046,965	$4,332,297
Unrestricted Days of Working Capital	-	215	223	209	196	191	185	183	182	187	198	206
Coverage Ratio (w/Impact Fees)			5.18	6.53	8.07	9.76	10.96	11.91	12.82	13.39	13.99	14.26
Coverage Ratio (w/o Impact Fees)			5.18	6.53	8.07	9.76	10.96	11.91	12.82	13.39	13.99	14.26

Orem City

Utility Rate Study
Sanitary Sewer
Scenario 3: 10 Year CIP No Bond

			Year 1	Year 2	Year 3	Year 4	Year 5					
			0.5%	17.0%	11.7%	11.9%	9.9%	8.0%	7.4%	6.8%	6.3%	4.5%
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Charges for Services	$6,444,975	$6,619,986	$6,650,408	$7,779,588	$8,689,197	$9,719,209	$10,682,563	$11,535,662	$12,387,468	$13,224,428	$14,062,483	$14,694,408
Estimated Increase from Door to Door Revs			$800,000	$800,000	$800,000	$800,000	$800,000	$800,000	$800,000	$800,000	$800,000	$800,000
Other Revenues (Including Connection Fees)	$1,562,186	$500,000	$505,000	$510,050	$515,151	$520,302	$525,505	$530,760	$536,068	$541,428	$546,843	$552,311
Total Operating Revenue	$8,007,161	$7,119,986	$7,955,408	$9,089,638	$10,004,348	$11,039,511	$12,008,068	$12,866,422	$13,723,535	$14,565,856	$15,409,326	$16,046,719
Operating Expense												
Personal Services	($1,830,390)	($1,885,302)	($1,941,861)	($2,000,117)	($2,060,120)	($2,121,924)	($2,185,581)	($2,251,149)	($2,318,683)	($2,388,244)	($2,459,891)	($2,533,688)
Supplies and Maintenance	($714,679)	($736,119)	($665,041)	($777,959)	($868,920)	($971,921)	($1,068,256)	($1,153,566)	($1,238,747)	($1,322,443)	($1,406,248)	($1,469,441)
Administrative Fee	($648,162)	($667,607)	($670,649)	($783,567)	($874,528)	($977,529)	($1,073,865)	($1,159,174)	($1,244,355)	($1,328,051)	($1,411,857)	($1,475,049)
Utilities	($649,009)	($668,479)	($688,534)	($709,190)	($730,465)	($752,379)	($774,951)	($798,199)	($822,145)	($846,810)	($872,214)	($898,380)
Contract Services	($576,514)	($593,809)	($611,624)	($629,972)	($648,872)	($668,338)	($688,388)	($709,040)	($730,311)	($752,220)	($774,787)	($798,030)
Equipment Lease and Rentals	($11,996)	($12,356)	($12,727)	($13,108)	($13,502)	($13,907)	($14,324)	($14,754)	($15,196)	($15,652)	($16,122)	($16,605)
Insurance	($112,738)	($116,120)	($119,604)	($123,192)	($126,888)	($130,694)	($134,615)	($138,654)	($142,813)	($147,098)	($151,510)	($156,056)
Changes in Lieu of Property Tax	($52,665)	($54,245)	($55,872)	($57,548)	($59,275)	($61,053)	($62,885)	($64,771)	($66,714)	($68,716)	($70,777)	($72,901)
Miscellaneous	($104,167)	($107,292)	($110,511)	($113,826)	($117,241)	($120,758)	($124,381)	($128,112)	($131,956)	($135,914)	($139,992)	($144,191)
Total Operating Expense	($4,700,320)	($4,841,330)	($4,876,421)	($5,208,479)	($5,499,810)	($5,818,503)	($6,127,245)	($6,417,419)	($6,710,920)	($7,005,147)	($7,303,398)	($7,564,341)
Net Operating Income (Loss)	$3,306,841	$2,278,657	$3,078,986	$3,881,159	$4,504,538	$5,221,008	$5,880,823	$6,449,003	$7,012,615	$7,560,709	$8,105,928	$8,482,378
Total Non Operating Revenue	$102,717	$39,132	$39,523	$39,918	$40,317	$40,720	$41,128	$41,539	$41,954	$42,374	$42,798	$43,226
Total Revenue Available for DS	$3,409,558	$2,317,788	$3,118,509	$3,921,077	$4,544,855	$5,261,728	$5,921,950	$6,490,542	$7,054,569	$7,603,083	$8,148,726	$8,525,603
Debt Service												
1994	($246,330)	-	-	-	-	-	-	-	-	-	-	-
2005A	-	-	-	-	-	-	-	-	-	-	-	-
2005B	-	-	-	-	-	-	-	-	-	-	-	-
2008	-	-	-	-	-	-	-	-	-	-	-	-
2010	($594,000)	($594,000)	($594,000)	($594,000)	($594,000)	($594,000)	($594,000)	($594,000)	($594,000)	($595,000)	($595,000)	($595,000)
2013 Refunding of 2005A	-	-	-	-	-	-	-	-	-	-	-	-
Proposed: Series 2018		-	-	-	-	-	-	-	-	-	-	-
Proposed: Series 2021		-	-	-	-	-	-	-	-	-	-	-
Total DS	($840,330)	($594,000)	($594,000)	($594,000)	($594,000)	($594,000)	($594,000)	($594,000)	($594,000)	($595,000)	($595,000)	($595,000)
Total Revenue Available for CIP	$2,569,228	$1,723,788	$2,524,509	$3,327,077	$3,950,855	$4,667,728	$5,327,950	$5,896,542	$6,460,569	$7,008,083	$7,553,726	$7,930,603
Total CIP	-		($2,339,818)	($3,082,893)	($3,870,292)	($4,653,328)	($5,231,885)	($5,757,901)	($6,271,586)	($6,702,834)	($7,139,571)	($7,586,560)
Proposed: Series 2018 Proceeds		-	-	-	-	-	-	-	-	-	-	-
Proposed: Series 2021 Proceeds		-	-	-	-	-	-	-	-	-	-	-
Total Bond Proceeds		-	-	-	-	-	-	-	-	-	-	-
Net Income (Loss) Before Transfers	$2,569,228	$1,723,788	$184,691	$244,184	$80,563	$14,400	$96,066	$138,642	$188,983	$305,249	$414,154	$344,044
Contributions from Outside Sources	$112,960	$88,692	$89,579	$90,475	$91,380	$92,294	$93,217	$94,149	$95,090	$96,041	$97,002	$97,972
Contributions from Government Funds		-	-	-	-	-	-					
Transfers In		-	-	-	-	-	-	-	-	-	-	-
Transfers Out	($190,205)	($141,843)	($143,262)	($144,694)	($146,141)	($147,603)	($149,079)	($150,569)	($152,075)	($153,596)	($155,132)	($156,683)
Change in Net Position	$2,491,983		$131,009	$189,965	$25,802	($40,909)	$40,204	$82,221	$131,998	$247,694	$356,024	$285,332
Beginning Cash Balance			$2,895,824	$3,026,833	$3,216,798	$3,242,599	$3,201,691	$3,241,894	$3,324,115	$3,456,114	$3,703,808	$4,059,832
Ending Fund Balance			$3,026,833	$3,216,798	$3,242,599	$3,201,691	$3,241,894	$3,324,115	$3,456,114	$3,703,808	$4,059,832	$4,345,164
General Fund Restricted (Bond Proceeds)		-	-	-	-	-	-	-	-	-	-	-
Unrestricted		$2,895,824	$3,026,833	$3,216,798	$3,242,599	$3,201,691	$3,241,894	$3,324,115	$3,456,114	$3,703,808	$4,059,832	$4,345,164
Unrestricted Days of Working Capital	-	215	223	222	212	198	190	186	185	190	200	207
Coverage Ratio (w/Impact Fees)			5.18	6.53	7.58	8.79	9.90	10.86	11.81	12.71	13.62	14.26
Coverage Ratio (w/o Impact Fees)			5.18	6.53	7.58	8.79	9.90	10.86	11.81	12.71	13.62	14.26

Orem City

Utility Rate Study
Sanitary Sewer
Scenario 4: Bonding

			Year 1	Year 2	Year 3	Year 4	Year 5					
			0.5%	17.0%	11.0%	11.2%	9.9%	8.0%	7.7%	7.1%	6.6%	4.8%
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Charges for Services	$6,444,975	$6,619,986	$6,650,408	$7,779,588	$8,635,496	$9,602,169	$10,552,820	$11,392,974	$12,275,705	$13,150,164	$14,023,480	$14,694,408
Estimated Increase from Door to Door Revs			$800,000	$800,000	$800,000	$800,000	$800,000	$800,000	$800,000	$800,000	$800,000	$800,000
Other Revenues (Including Connection Fees)	$1,562,186	$500,000	$505,000	$510,050	$515,151	$520,302	$525,505	$530,760	$536,068	$541,428	$546,843	$552,311
Total Operating Revenue	$8,007,161	$7,119,986	$7,955,408	$9,089,638	$9,950,647	$10,922,471	$11,878,325	$12,723,734	$13,611,773	$14,491,592	$15,370,322	$16,046,719
Operating Expense												
Personal Services	($1,830,390)	($1,885,302)	($1,941,861)	($2,000,117)	($2,060,120)	($2,121,924)	($2,185,581)	($2,251,149)	($2,318,683)	($2,388,244)	($2,459,891)	($2,533,688)
Supplies and Maintenance	($714,679)	($736,119)	($665,041)	($777,959)	($863,550)	($960,217)	($1,055,282)	($1,139,297)	($1,227,570)	($1,315,016)	($1,402,348)	($1,469,441)
Administrative Fee	($648,162)	($667,607)	($670,649)	($783,567)	($869,158)	($965,825)	($1,060,890)	($1,144,906)	($1,233,179)	($1,320,625)	($1,407,956)	($1,475,049)
Utilities	($649,009)	($668,479)	($688,534)	($709,190)	($730,465)	($752,379)	($774,951)	($798,199)	($822,145)	($846,810)	($872,214)	($898,380)
Contract Services	($576,514)	($593,809)	($611,624)	($629,972)	($648,872)	($668,338)	($688,388)	($709,040)	($730,311)	($752,220)	($774,787)	($798,030)
Equipment Lease and Rentals	($11,996)	($12,356)	($12,727)	($13,108)	($13,502)	($13,907)	($14,324)	($14,754)	($15,196)	($15,652)	($16,122)	($16,605)
Insurance	($112,738)	($116,120)	($119,604)	($123,192)	($126,888)	($130,694)	($134,615)	($138,654)	($142,813)	($147,098)	($151,510)	($156,056)
Changes in Lieu of Property Tax	($52,665)	($54,245)	($55,872)	($57,548)	($59,275)	($61,053)	($62,885)	($64,771)	($66,714)	($68,716)	($70,777)	($72,901)
Miscellaneous	($104,167)	($107,292)	($110,511)	($113,826)	($117,241)	($120,758)	($124,381)	($128,112)	($131,956)	($135,914)	($139,992)	($144,191)
Total Operating Expense	($4,700,320)	($4,841,330)	($4,876,421)	($5,208,479)	($5,489,069)	($5,795,095)	($6,101,297)	($6,388,881)	($6,688,568)	($6,990,294)	($7,295,597)	($7,564,341)
Net Operating Income (Loss)	$3,306,841	$2,278,657	$3,078,986	$3,881,159	$4,461,577	$5,127,376	$5,777,029	$6,334,853	$6,923,205	$7,501,298	$8,074,726	$8,482,378
Total Non Operating Revenue	$102,717	$39,132	$39,523	$39,918	$40,317	$40,720	$41,128	$41,539	$41,954	$42,374	$42,798	$43,226
Total Revenue Available for DS	$3,409,558	$2,317,788	$3,118,509	$3,921,077	$4,501,894	$5,168,097	$5,818,156	$6,376,392	$6,965,159	$7,543,672	$8,117,523	$8,525,603
Debt Service												
1994	($246,330)	-	-	-	-	-	-	-	-	-	-	-
2005A	-	-	-	-	-	-	-	-	-	-	-	-
2005B	-	-	-	-	-	-	-	-	-	-	-	-
2008	-	-	-	-	-	-	-	-	-	-	-	-
2010	($594,000)	($594,000)	($594,000)	($594,000)	($594,000)	($594,000)	($594,000)	($594,000)	($594,000)	($595,000)	($595,000)	($595,000)
2013 Refunding of 2005A	-	-	-	-	-	-	-	-	-	-	-	-
Proposed: Series 2018		-	-	($339,396)	($339,396)	($339,396)	($339,396)	($339,396)	($339,396)	($339,396)	($339,396)	($339,396)
Proposed: Series 2021		-	-	-	-	-	($565,660)	($565,660)	($565,660)	($565,660)	($565,660)	($565,660)
Total DS	($840,330)	($594,000)	($594,000)	($933,396)	($933,396)	($933,396)	($1,499,056)	($1,499,056)	($1,499,056)	($1,500,056)	($1,500,056)	($1,500,056)
Total Revenue Available for CIP	$2,569,228	$1,723,788	$2,524,509	$2,987,681	$3,568,499	$4,234,701	$4,319,101	$4,877,336	$5,466,104	$6,043,617	$6,617,468	$7,025,548
Total CIP	-		($2,339,818)	($7,243,498)	($3,503,661)	($4,250,862)	($11,756,043)	($4,774,233)	($5,304,597)	($5,756,898)	($6,213,169)	($6,681,504)
Proposed: Series 2018 Proceeds		-	-	$4,500,000	-	-	-	-	-	-	-	-
Proposed: Series 2021 Proceeds		-	-	-	-	-	$7,500,000	-	-	-	-	-
Total Bond Proceeds		-	-	$4,500,000	-	-	$7,500,000	-	-	-	-	-
Net Income (Loss) Before Transfers	$2,569,228	$1,723,788	$184,691	$244,184	$64,838	($16,162)	$63,058	$103,103	$161,506	$286,719	$404,298	$344,044
Contributions from Outside Sources	$112,960	$88,692	$89,579	$90,475	$91,380	$92,294	$93,217	$94,149	$95,090	$96,041	$97,002	$97,972
Contributions from Government Funds		-	-	-	-	-	-					
Transfers In		-	-	-	-	-	-	-	-	-	-	-
Transfers Out	($190,205)	($141,843)	($143,262)	($144,694)	($146,141)	($147,603)	($149,079)	($150,569)	($152,075)	($153,596)	($155,132)	($156,683)
Change in Net Position	$2,491,983		$131,009	$189,965	$10,076	($71,471)	$7,196	$46,682	$104,522	$229,164	$346,168	$285,332
Beginning Cash Balance			$2,895,824	$3,026,833	$3,216,798	$3,226,874	$3,155,403	$3,162,599	$3,209,281	$3,313,803	$3,542,967	$3,889,135
Ending Fund Balance			$3,026,833	$3,216,798	$3,226,874	$3,155,403	$3,162,599	$3,209,281	$3,313,803	$3,542,967	$3,889,135	$4,174,467
General Fund Restricted (Bond Proceeds)		-	-	-	-	-	-	-	-	-	-	-
Unrestricted		$2,895,824	$3,026,833	$3,216,798	$3,226,874	$3,155,403	$3,162,599	$3,209,281	$3,313,803	$3,542,967	$3,889,135	$4,174,467
Unrestricted Days of Working Capital	-	215	223	222	212	196	187	181	178	182	192	199
Coverage Ratio (w/Impact Fees)			5.18	4.16	4.78	5.49	3.85	4.23	4.62	5.00	5.38	5.65
Coverage Ratio (w/o Impact Fees)			5.18	4.16	4.78	5.49	3.85	4.23	4.62	5.00	5.38	5.65